THE UNIVERSITY OF TEXAS BULLETIN
No. 3327: July 15, 1933

A PREHISTORIC ROCK SHELTER IN VAL VERDE COUNTY, TEXAS

By

J. E. PEARCE
Professor of Anthropology
and
Director of Research in Texas Archaeology

and

A. T. JACKSON
Field Foreman in Archaeology

Bureau of Research in the Social Sciences
Study No. 6

Anthropological Papers, Vol. I, No. 3

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The benefits of education and of useful knowledge, generally diffused through a community, are essential to the preservation of a free government.

Sam Houston

Cultivated mind is the guardian genius of Democracy, and while guided and controlled by virtue, the noblest attribute of man. It is the only dictator that freemen acknowledge, and the only security which freemen desire.

Mirabeau B. Lamar

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Homo sum: humani nihil a me alienum puto

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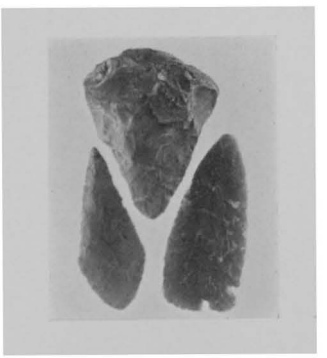

PREFACE

This monograph is Number 3 in Volume I of a series of anthropological papers that are to appear, we hope, continuously through the years, under auspices of the Department of Anthropology of The University of Texas. Numbers 1 and 2 of this volume are in process of preparation, but, because of field work now going on which may modify their contents, their publication is being delayed. This monograph, on the other hand, is complete, being an account of work done in and returns from one rock shelter.

In writing this paper the field notes of Mr. Jackson, Field Foreman in charge of the work of excavation, formed the basis, and the bulk of these notes was taken over bodily. The cleaning of specimens and much of the analysis of the returns were done by Mr. Sidney J. Thomas, who wrote his master's thesis under direction of the senior author on the returns from this shelter. Mr. Jackson supplemented Mr. Thomas' analyses and interpretations with much study on his own part. Where Mr. Thomas' interpretations were accepted unmodified they were incorporated in quotations.

The senior author as editor and supervisor has given his own interpretations wherever they were in conflict with those of the junior author except where the latter's interpretations were allowed to remain with annotations explaining discrepancies.

The culture is that of a modified late Basket Maker type and probably came down to historical times. No traces of white contacts were found, and no traces of pottery or of corn culture were encountered. The numerous grindstones were employed chiefly if not entirely in grinding paints or in grinding mesquite beans and other seeds of native wild plants.

Too much credit cannot be given Mr. Jackson for his assiduous and painstaking care in directing the work, in taking accurate, dependable notes, and in making definite, well-chosen, and dependable field photographs.

J. E. PEARCE.

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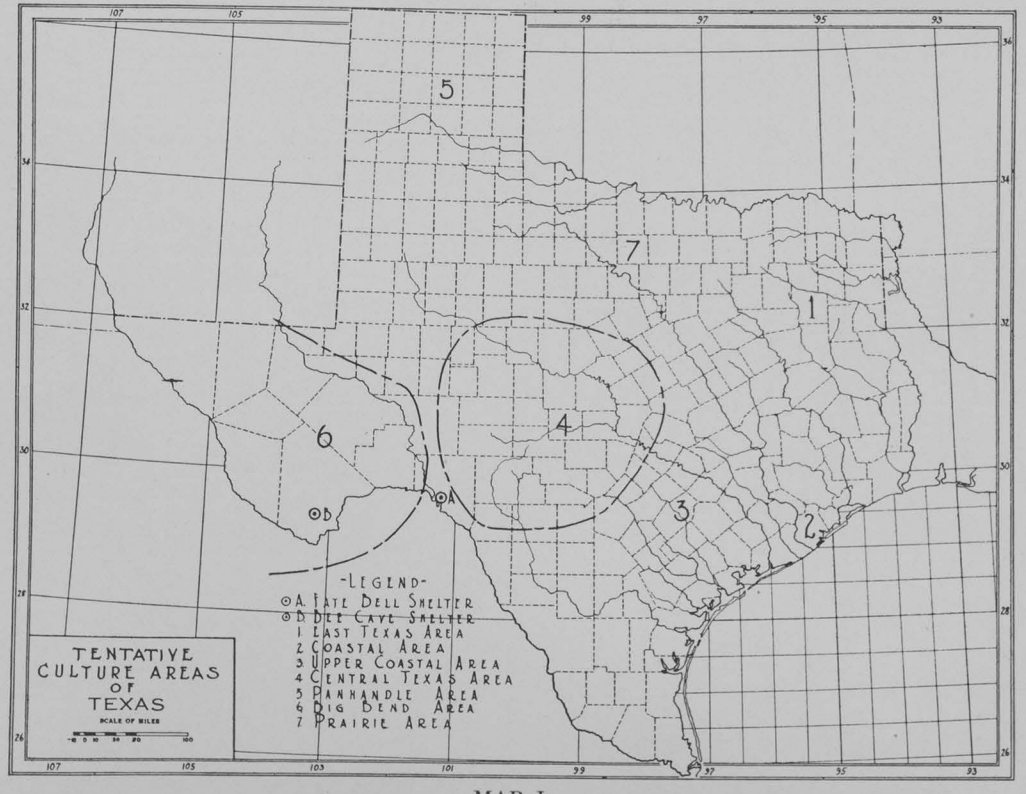

TENTATIVE
CULTURE AREAS
OF
TEXAS
SCALE OF MILES
-LEGEND-
A FATE BELL SHELTER
D DEE CAVE SHELTER
1 EAST TEXAS AREA
2 COASTAL AREA
3 UPPER COASTAL AREA
4 CENTRAL TEXAS AREA
5 PANHANDLE AREA
6 BIG BEND AREA
7 PRAIRIE AREA

MAP I

A PREHISTORIC ROCK SHELTER IN VAL VERDE COUNTY, TEXAS

By J. E. Pearce and A. T. Jackson

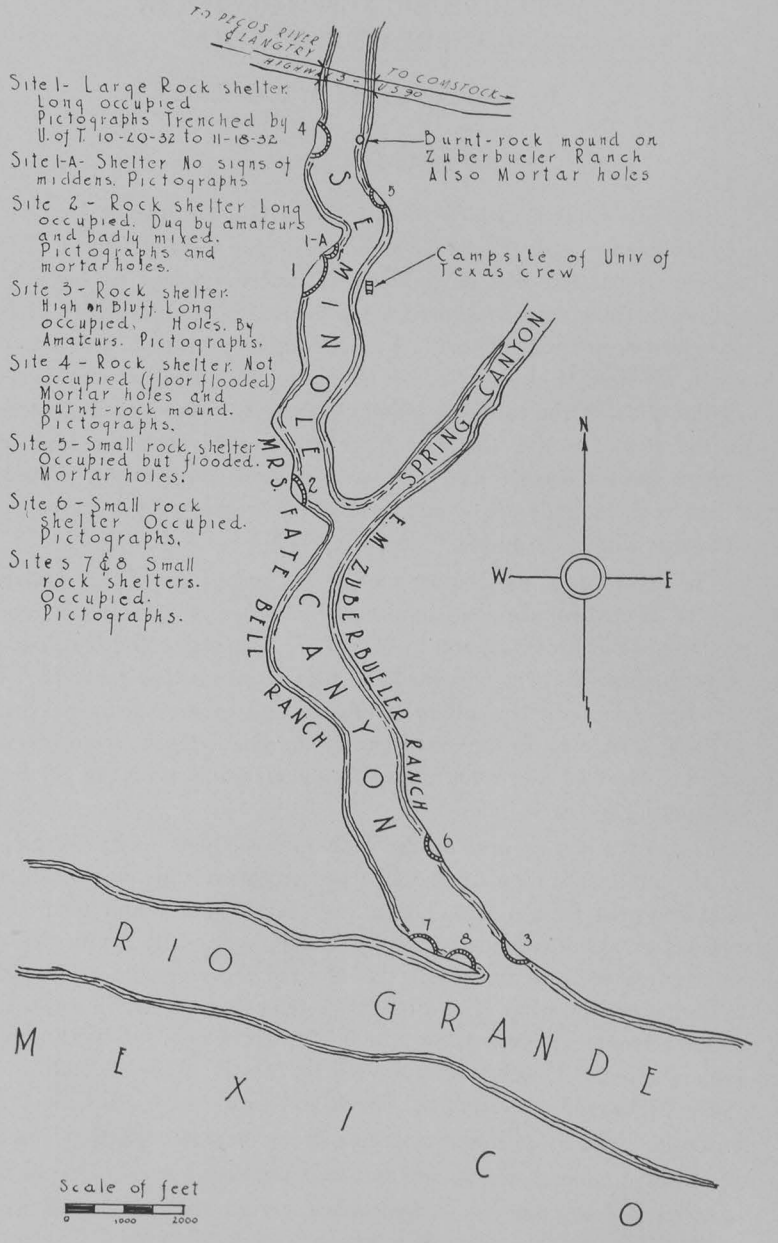
Seminole Canyon

Seminole Canyon, which flows into the Rio Grande, is located a few miles east of the Pecos River in Val Verde County, Texas. This canyon is cut into the hard Edwards limestone, and its confining walls constitute, here and there, steep overhanging cliffs which easily pass into deep rock shelters. A considerable portion of the canyon south of State Highway No. 3 (U. S. No. 90) is so characterized. In the cliffs of the canyon's east side there are three rock shelters; in the cliffs forming the west bank are five between the highway bridge and the Rio Grande, a distance of some three miles. Several burnt rock mounds are located along the course of the canyon on the talus within the bluffs. (See Map II.)

The attention of the Department of Anthropology of The University of Texas was directed in the late summer of 1932 to the rock shelters in Seminole Canyon by Mr. W. F. Boggess of Del Rio, Texas. A reconnaissance trip was made to that region in the early part of October. The shelters along Seminole and other nearby canyons, as well as several on the east bank of the Pecos River, were investigated. Most of the sites showed unmistakable evidence of long occupation by early man.

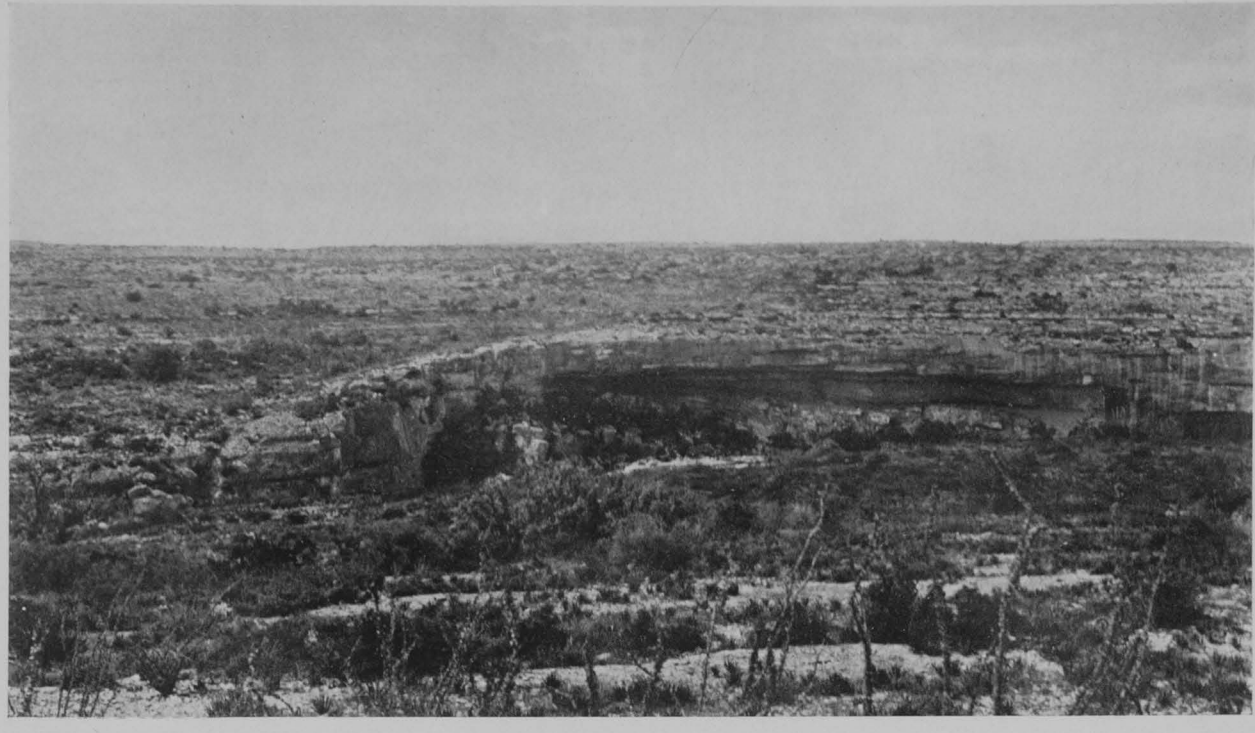
Unfortunately, several of the shelters have been badly disturbed by the haphazard digging of untrained amateurs. Mr. W. G. Muter, a taxidermist in Del Rio, has a very large basket and part of a blanket or garment made by wrapping fur, apparently rabbit fur, on fiber cords to form the wool. He secured these specimens in what is designated on Map II as Site No. 2, less than one mile down the canyon from Site No. 1, in which The University of Texas crew later worked. A collection gathered by Messrs. Richard Smith and Eddie McCarson of Comstock, Texas, was secured for the University museum. The most interesting specimens in that collection consist of a basket, almost whole, and two well preserved mats. One of the mats came from Site No. 2 Seminole Canyon; the basket and other

•Sketch Map•
•Seminole Canyon (Lower Portion)•
•Val Verde County Texas•



MAP II

PLATE I



View of the rock shelter as seen from the opposite side of Seminole Canyon.

mat came from a shelter in Presa Canyon, some three miles southeast of Site No. 1 Seminole Canyon.

Muter states that the specimens he secured accompanied a child burial, at a depth of about three feet, in the central part of the shelter near the wall. The fur mat or garment, he said, covered the skull, and immediately over the fur covering was the basket. Smith and McCarson state that several burials they helped uncover had small baskets over the skulls and large baskets or mats over the entire skeleton.

Site No. 1 Seminole Canyon

Site No. 1 was selected for work by our expedition because it was the least disturbed and the largest shelter in Seminole Canyon. Located in the western wall of the canyon, facing east, it is protected from north and west winds. It is about ten miles south of the head of the canyon and nine miles south of west of Comstock, Val Verde County. The shelter, which is crescent-shaped, can be reached only by climbing a steep talus slope from the bottom of the canyon to a height of about 100 feet (Plate I). At the foot of the cliff in which the shelter is located runs the small stream. In the dry season it sometimes ceases to run; but, according to ranchmen who have lived in the region for years, there are always a few water holes in the canyon near the shelter.

Site No. 1 is on land owned by Mrs. Fate Bell of Del Rio and leased by Mr. P. H. McNutt, who lives near Comstock. The ranch is managed by Mr. E. F. McNutt. Permission to excavate was secured from all parties concerned.

The Fate Bell Ranch was formerly known as Wilkins Ranch and so appears on the U. S. Army map of the region.[1]

Five men were engaged at the work in this shelter from October 20 to November 18, 1932. The extent of the work conducted will be discussed in detail.

The dimensions of the shelter, Site No. 1, are as follows: length north-south, at wall, 515 feet; length north-south, at outer edge, 454 feet; depth of shelter at 140 feet from south end, measured along the wall, and 110 feet from south end, measured along the outer

[1]Progressive Military Map of United States, Southern Department—Texas. Sheet 430N, Comstock.

PLATE II

Interior of the shelter before beginning work. The shovel is in a so-called sotol pit. Note the trench markers in the background.

rim, 98 feet. The line by which the depth was measured is an east-west course. The point at which the measurement was taken represents the maximum depth, or overhang, of the shelter. The amount of overhang decreases rather gradually from this point toward both the north and south ends of the shelter. At the south end (zero line) the overhang is 17 feet; at 300 feet from the south end the overhang is 35 feet, with only 20 feet of that distance showing human occupation (due to fallen boulders); at 450 feet from the south end the overhang is 39 feet, with 29 feet indicating occupation; at 515 feet, or the northern end, the overhang is 12 feet.

From 450 to 515 feet, the 65 feet at the north end of the shelter, there is much talus, with steeply sloping floor, and no signs of human occupancy. The workable occupied portion extends north-south for a distance of 450 feet and east-west an average of 41 feet.

Burnt Rock Pits in Shelter

Scattered irregularly throughout the occupied portion of the shelter are pits of varying diameters and depths (Plate II). These are known locally as "sotol pits," based on the assumption that they were left as the result of the cooking of sotol "heads" or crowns. This probable use of the pits seems to be borne out by the presence of countless fragments of sotol leaves, hundreds of small burnt limestone rocks, and beds of ashes.

In this connection E. W. Wilson quotes from a statement by F. M. Buckelew, who in 1866 at the age of fourteen was captured by the Lipan Indians:

> Another choice food of these Indians, and one in almost constant use, was the "Soto" root, or bulb of the soto plant, which grew in great abundance along these western rivers, and which, when accessible, formed a choice winter food for cattle. In the preparation of this plant for food, large quantities of the bulbs were gathered and collected in a place suitable for a large kiln. A large circular hole was then dug three or four feet deep and several feet in diameter. In this hole they would place a large pile of wood and rock in such a way that the rocks would become thoroughly heated by the time the wood was consumed. The rocks were then replaced in such a way that the soto could be placed on and around them. When this was completed, brush and leaves were placed next to the soto, and the entire heap covered over with dirt so as to make it air-tight. This was allowed to remain several days during which time the heat from the rocks would penetrate the soto, and thoroughly cook it. When satisfied that the contents were thoroughly cooked, they would remove the dirt and leaves, exposing a glistening white heap of crisp soto. The bulbs were

then spread out in the sun where they could dry. When perfectly dry, the flakes or thin layers would separate easily. This completed, the task of preparing it for food was just begun, as it was necessary to make large holes in rocks or logs in which the soto was placed, when it was beaten and ground by large wooden pestles until it resembled white flour. This flour was then mixed with water and made into small cakes and baked in the ashes and embers of a fire.[2]

DATA CONCERNING PITS*

Pit No.	Depth, Inches	Diameter, in Feet		Distance, in Feet	
		Bottom	Top	From Wall	From South End
1	25	4	13	36½	76
2	36	6	19	41	105
3	42	5	19	64	162
4	39	4½	19½	56	190
5	36	6	17	27½	215
6	30	4	16½	32	240
7	32	4	18	21	413

*See Map III, which shows the locations of these pits.

Another interesting feature is the fact that the fragments of sotol and the ashes are found on opposite sides of the pits. In each case most of the sotol fragments are on the east side of the pit, *i.e.*, on the side towards the morning sun, while in six out of seven cases the greater portion of the ashes appear on the west or shaded sides of the pits. Lesser quantities of sotol and ashes are present on other sides of the pits.

POSITION OF SOTOL AND ASHES

Pit No.	Sides of Pit on Which Located	
	Sotol	Ashes
1	East and north	South and west
2	East and south	North and west
3	East and south	North and west
4	East and north	West and south
5	East and north	West and south
6	East and west	North and south
7	East and south	North and west

[2]E. W. Wilson, *Burned Rock Mounds of Southwest Texas*, pp. 59–62; quoting F. M. Buckelew, *The Indian Captive*, pp. 72–73.

In every instance the bottom of the pit is covered with burnt rocks, with large numbers of them also scattered about the rim of the pit.

Surface Mortar Holes and Metates

A somewhat unusual feature of this site is the absence of deep mortar holes in the rock ledges and boulders adjacent to the shelter. Deep mortar holes are present in such places at most of the other large shelters in the region. Hence we were at a loss to explain their absence here until, in the progress of the work, deep mortar holes were found buried in the bedrock of the shelter beneath the camp refuse (Plate VII). There are, however, a number of surface boulders in the shelter that show shallow pits (Fig. 1) and slightly worn depressions. These pits are larger than ordinary "nut-cracker holes." We counted seventy-six of these shallow pits, beginnings of mortar holes on the surfaces of boulders, and none was more than four and a half inches deep. The rock ledge in the bottom of the canyon below the shelter also shows the remains of two mortar holes that have been partially eroded out by freshets in the canyon stream. Six metates were found on the surface inside the shelter.

Pictographs in the Shelter

Many pictographs are to be seen in various states of preservation on the wall of the rockshelter. Most of them are painted in red, but some combine red and yellow (or orange). A few are done in red and black. In nearly every case where two colors are used, the body of the picture is in red and the other color is applied to make an outline or to form a border. In one group of large paintings black and orange are used more extensively than red. The red paint was probably made from oxide of iron; yellow, from ocher, while charcoal or soot seems to have been the basis of the black paint.

The brightness, or vividness, of the paintings varies greatly. Many are so dim as to be untraceable; others are fairly dim; and some are very bright and distinct. No picture in this shelter shows any evidence of contact with the white race. The figures are human and animal or fantastic and nondescript, possibly symbolic in some instances.

Figure 1. Shallow pits, the beginnings of mortar holes, worn into surface of rock at north end of the shelter in portion not covered with deposit.

There is a wide range in the sizes of the pictographs. They vary from tiny ones only 2 or 3 inches in length and height to some as much as 4½ feet in height, and one group is 17 feet in length.

On the northern part of the shelter wall are pictures at heights ranging from 5 to 30 feet above the present floor level. It seems that ladders would have been necessary to enable the ancient artists to paint pictures so high on the wall.

Among the numerous pictographs are several of particular interest. One of the most outstanding groups is that of four large human figures located on the south portion of the wall (Plate III a). The central figure, measuring 55 inches in height and with a width of only 7 inches at the knees, appears to be a man clad in ceremonial costume. The deer head mask, or deer horn headdress, shows a striking similarity to Morss's deer horn pictographs in Utah.[3]

It is interesting to note the fringe on the garment worn by the figure on the right in the above mentioned group. Fringe of this type, and often much more pronounced, is common to many of the human figure pictographs in the region.

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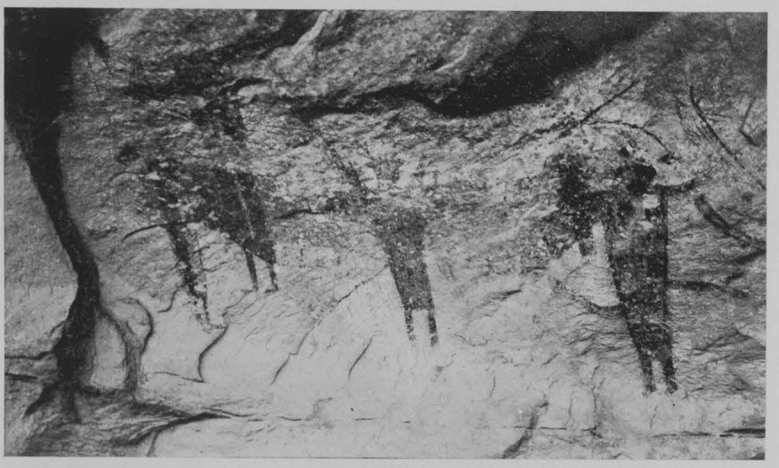
[3]Noel Morss, "The Ancient Culture of the Fremont River in Utah," Report on the Explorations of 1928–1929, *Papers of the Peabody Museum of American Archeology and Ethnology*, XII, No. 3, pp. 36–39.

An unusual pictograph painted in red appears on the wall slightly above the present floor level. The cave deposit probably has filled in and raised the floor some four feet since the picture was painted. The total height of the group is 39 inches with a total width of 21 inches. This is a nondescript figure to which it is hard to assign a definite meaning. Immediately to the left and right of the main figure in the group are so-called "pole-ladder" designs (Plate III b). The one to the right may represent some form of decoration hanging from the outstretched arm, such an ornament as appears in pictographs in other shelters of the vicinity.

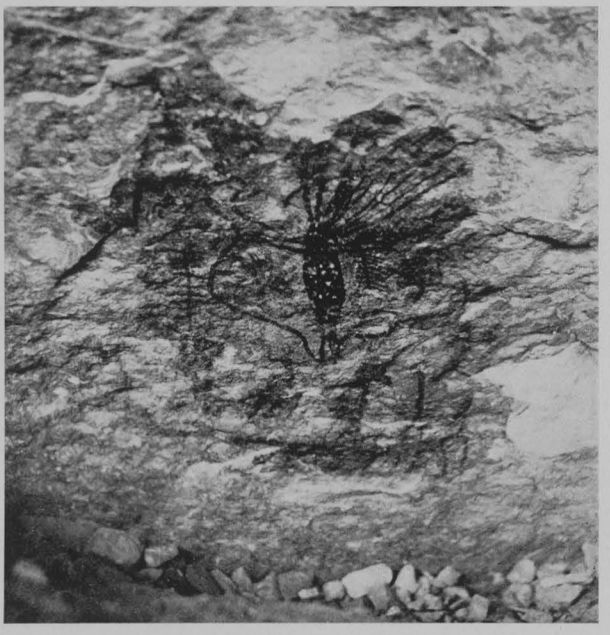
The second largest group of paintings covers a wall space 13 feet 4 inches in length and 30 inches in height. To the left (Plate IV a) are four snake-like designs and a box-like object with two legs attached. Similar "boxes" are present on the walls of certain nearby shelters. The snakes are about forty inches long. The right portion of the group (Plate IV b) is of interest because of the composite nature of the creature to the extreme right. It has outspread wings that suggest a bat, yet on its head are horns resembling a deer horn headdress. Five lizard-like figures show clearly. The remains of very dim pictographs have bright paintings superimposed in places. In the bright paintings in this group the predominating color is red, with some yellow and black.

Another group consists of birds and insects. The conventionalized insects are 7½ inches long and each bird is about five inches tall. They were painted in red but are now very dim. The birds are realistically portrayed with long slender legs, well proportioned bodies, long wings outspread, long gracefully curved necks with long beaks, and open mouths. The birds are immediately beneath the insects, and the condition of the paintings seems to indicate that they were contemporaneous.

What seems to have been the most intricate pictograph on the wall of this shelter is now in a very bad state of preservation. The surface of the rock at this point has flaked off in many spots, thus destroying the completeness of the painting. From what remains of it, however, it is possible to determine that it was composed of alternating red and yellow wavy lines radiating from a red disc in the center. It may have been a large sun symbol. The total diameter of the painting is 32 inches.

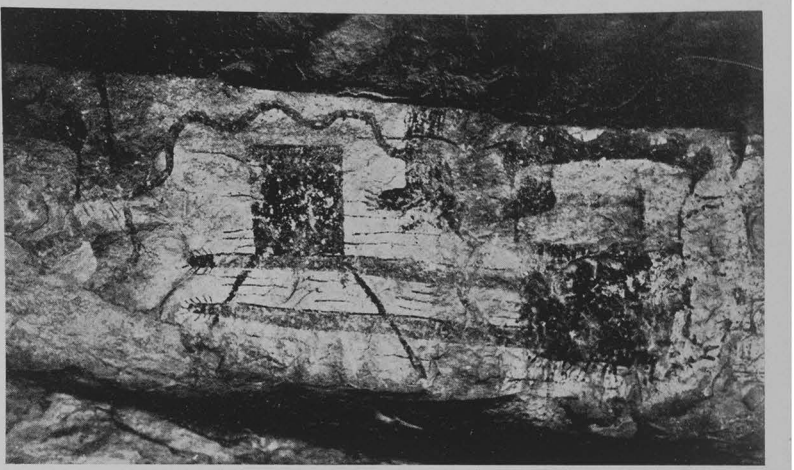


(a) Group of pictographs on shelter wall; length of series, 17 feet; height, 55 inches. Colors: red, yellow, and black; from iron oxide, ocher, and charcoal.



(b) Unusual pictograph, in red, on shelter wall. Total height, 39 inches; total width, 21 inches. Note the so-called "pole ladder" designs, to left and right.

PLATE IV



(a) Unusual combination of pictographs on shelter wall. Mostly red, with some yellow and black. Height, over all, 30 inches. Similar box-like designs are found in nearby shelters.

(b) Group of pictographs immediately to right of (a) above. The combined group has a total length of 13 feet 4 inches. Note the bat-like creature to the right. Some of the distinct paintings are superimposed on very dim ones.

Another painting on the south wall is of a man with concentric circles around his head. The arms are outstretched with two snakes hanging from the right arm and a third snake, pierced by a stick, held in the left hand. Beside the man is a fourth snake. Between two of the snakes appears a double cross. This painting suggests a composite picture. It seems that originally a headless and armless man was painted in black. At a later time a few touches in red paint were added to the body, the legs were lengthened a trifle, arms were appended, three concentric circles were painted around the neck, and the snakes drawn. A third painter may have placed the yellow cross between the snakes.

A pictograph of particular interest is one showing a barbed and feathered arrowshaft piercing the neck of a nondescript horned creature. The paint has been scaled off in spots by flakes from the wall. The length of the victim is 39 inches and of the arrowshaft, 20½ inches. The colors are red and yellow.

Near the north end of the shelter, immediately above the present floor level, are dim paintings that may be called "dancing warriors." The combined facts of the dimness of the paint and the filling in of some four to five feet of midden deposit since the time of its painting bespeak considerable age for this group of pictographs. Thomas points out that this painting of ceremonial dancers is suggestive of the woven dancers in Navajo rugs.[4]

Several animals, among which are a rabbit and what appears to be a skunk, are painted in red on the wall of the shelter. One frog-like design, 17 inches long and painted in red, is similar to a pictograph on the wall of a rock shelter near Doss, Gillespie County, in Central Texas.

High on the roof of the shelter, at the northern end, is a large group of paintings outlined in red. The central picture, about four feet high, resembles a huge catfish. It, however, is not so realistic as catfish painted on the walls of several nearby shelters.

Of great interest, because of its being identical in form with certain East Texas pottery designs, is a well executed but dim sun

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[4]Sidney J. Thomas, *The Archaeological Investigation of Fate Bell Shelter, Seminole Canyon, Val Verde County, Texas,* M.A. thesis, The University of Texas, 1933. Hereafter, all mention of Thomas' work, which has been drawn upon considerably, will refer to this manuscript, in the Library of The University of Texas.

symbol painted in red. It consists of four concentric circles, the inner one bearing around its circumference nine triangular design elements, or sun-ray symbols. The diameter of the outer circle is 17 inches.

A group of pictures, high on the wall, seems to represent moons, men (?), and a snake. The symbols are painted in black with narrow red borders. There are thirteen moon symbols, thirteen men, and one huge snake. The "new moons," or crescents, are 12 inches in diameter and are arranged in two horizontal lines. The reclining men are in three similar rows. The snake, with mouth open and "tongues" protruding, is located below and to the right of the other paintings in the group. This unusual group of pictographs suggests a complete record of some kind. The thirteen moons and the thirteen men are suggestive of the calendar months. A painted pebble found in the camp refuse of the shelter bears a design, in black, that resembles this pictograph. These facts seem to bespeak not only some special significance for this design, but a highly conventional use of it.

Four paintings of conventionalized hands appear in close proximity on the wall. Two of them bear four fingers, one has six fingers, and the other represents the palm of the hand without fingers. Each is about ten inches high.

Pictographs in Site No. 1–A

Site No. 1–A adjoins No. 1 on the north and is really a continuation of the same site, although it is a separate shelter about one-fifth the size of the main one. There are a number of pictographs on the wall and roof of this site. The original floor, it seems, has been carried away by flood waters of the canyon so that there are no signs of midden material remaining, if ever present.

One picture, which is painted in red and is fairly bright, seems to represent a dancing person wearing a grass or reed skirt (Fig. 2). The skirt is "flying in the breeze," fan-like. The height of the figure is 27 inches and the width, across the skirt, 14 inches. The arms are upraised.

A huge insect (?) 7 feet long and 12 inches wide is painted red with a black border (Fig. 3). Similar paintings may be seen in nearby shelters.

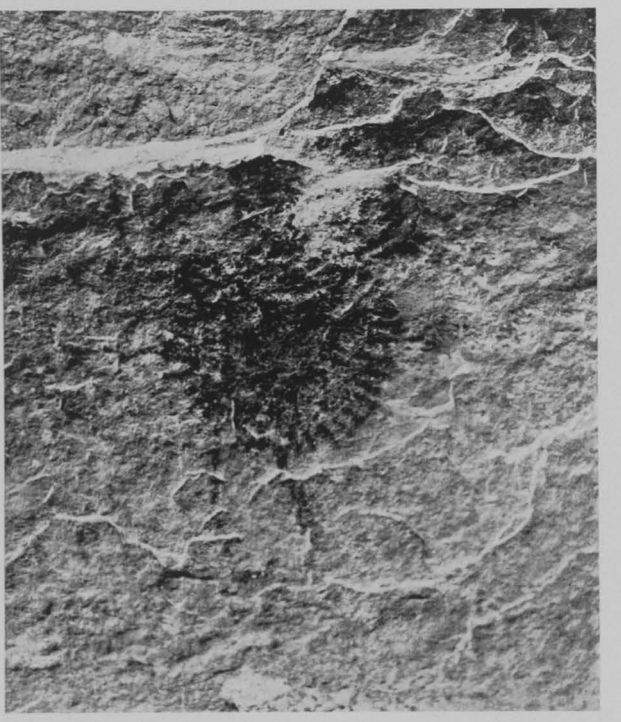


Figure 2. A dancing figure wearing a grass(?) skirt. Arms are upraised. Height is 27 inches.

On the roof, directly over the center of the shelter, are a number of pictographs. Prominent among these is one of a large squirrel with a length, from nose to base of tail, of 24 inches; length of tail, 30 inches; legs, 12 inches; claws, 2 to 3 inches. The rear third of the animal is painted a solid red; the remainder of the body is merely outlined in red. The bushy tail is curved gracefully over the animal's back.

Two bushes or trees, with a rectangular, cross-hatched "altar" between, are painted in very fine, red lines. The altar is about four feet high. On top of it rests a rounded heap, from which arise delicately spaced curved lines, possibly representing smoke. Beside the left tree are five painted insects; beside the right tree are a number of red dots, or splashes of paint.

On the ceiling are several splotched designs, painted in red, with small lines radiating from the edges. These splotches with fringe

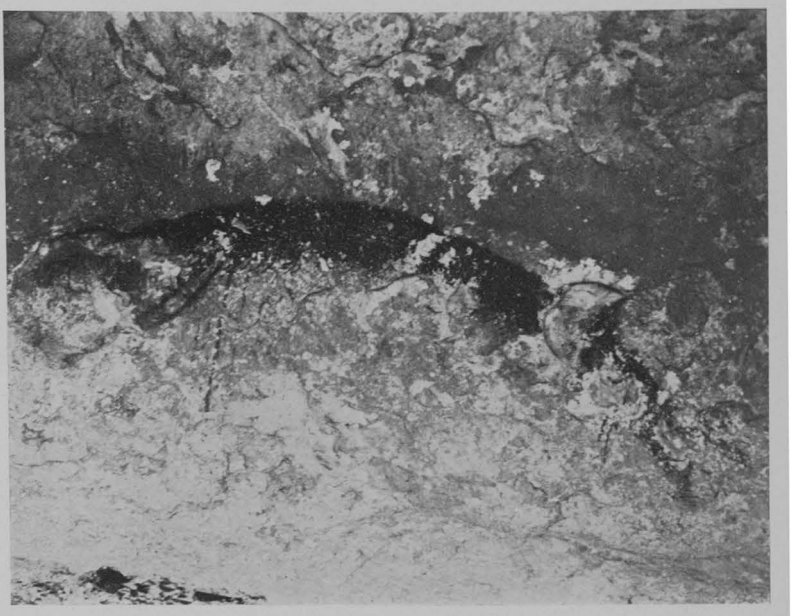


Figure 3. An insect (?) 7 feet long and 12 inches wide, painted red with a black border.

around the edges do not resemble the insect paintings. The splotch type, however, is fairly common in the region. The figures vary in size from 6 to 18 inches in length and are about half that width.

An unusual combination is what appears to be a rabbit climbing a tree. The tree is 40 inches tall, and shows roots, trunk, and branches. Since the painting of the tree is much dimmer than that of the rabbit, the latter probably is a superimposed picture.

There are a number of pictographs showing designs of rabbits and other animals, or hooded human figures. They range in height from 6 to 18 inches. All are painted red.

Painted in yellow is a human figure with arms upraised. One hand holds a pole-ladder, or triple-cross, while the other grasps a club. The height is 18 inches.

Among other dim pictographs on the wall of the shelter is a headless, one-armed human figure inside a zigzag enclosure. The enclosure is about two feet in diameter. Other designs include a twisted-fiber rope, an anchor-like design 7 feet long, painted in red

with a black border, and a sandal design 15 inches long and 6 inches wide.

Portion of Shelter Excavated

Due to the huge size of the rock shelter, Site No. 1, it was immediately evident that we would not have sufficient funds to undertake the complete excavation of the place at the time we began it. The mere handling of the dirt would have been a stupendous task, not to mention the vast amount of time and labor involved in sifting, troweling, and other labor. Based on the work we did, it would appear that the average depth of the midden deposit is 70 inches—approximately six feet. If that average holds good over the entire shelter, there are more than 100,000 cubic feet of earth, ashes, and rubbish deposited during occupation by ancient man.

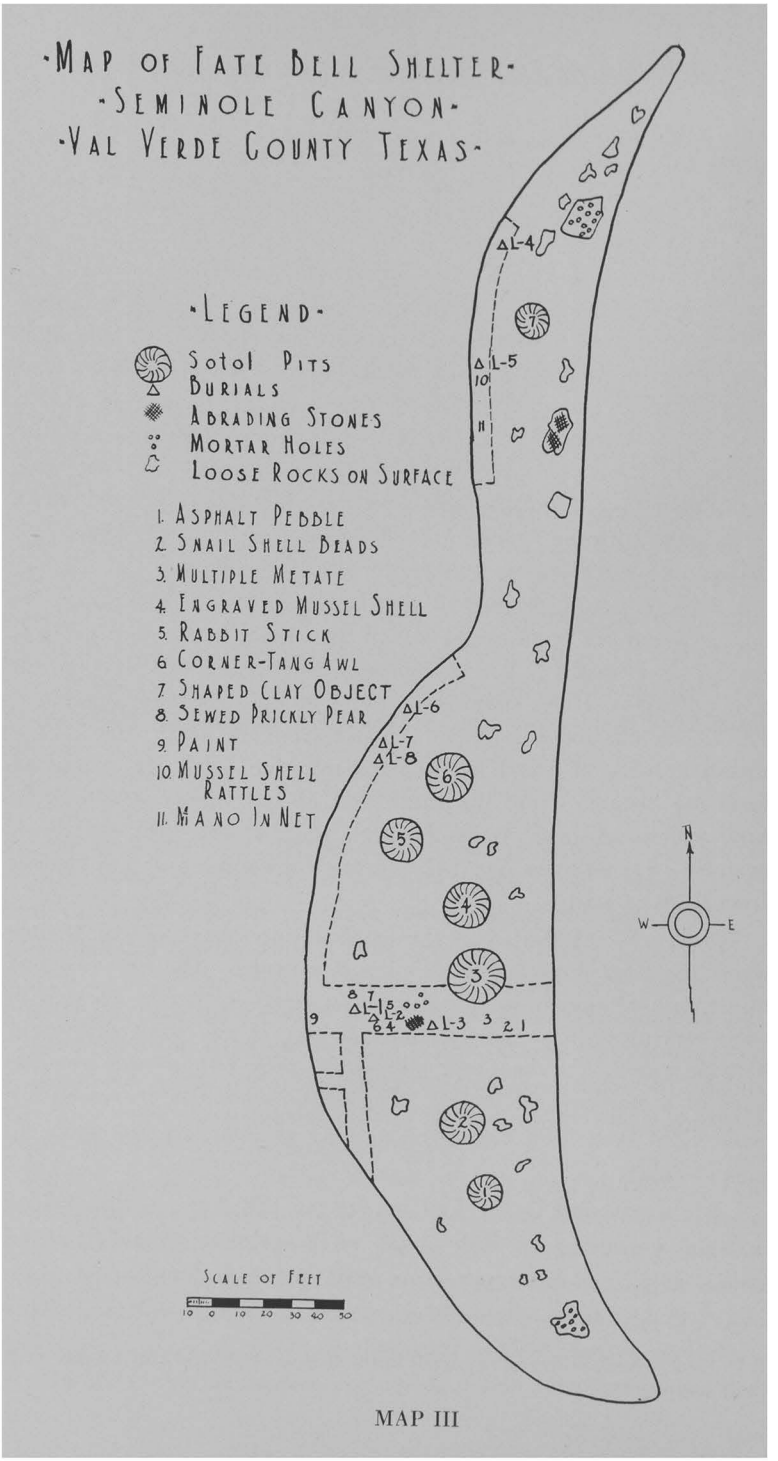
It was, therefore, decided to sink a trench 20 feet wide, down to bedrock, from the front to the rear of the shelter in the most promising part. Excavation was commenced by staking off, in five-foot squares, a twenty-foot strip at the point of the maximum overhang. The trench was located 140 to 160 feet from the south edge of the shelter and had a length of 98 feet (see Map III). In recording finds the distance from the south end of the shelter was written first, and the distance from the back wall, at the west, set down next, *e.g.*, 142–68, meaning 142 feet from the south end and 68 feet from the west wall.

The trench was started at the extreme outer edge of the shelter where the talus slope begins dipping downward. The first few feet of deposit contained hundreds of fragments of burnt rock with some soil, ashes, and charcoal intermixed. It was wet from recent blowing rains. At the outer edge solid rock bottom was encountered at a depth of 24 inches. The depth gradually increased for some eight feet, then rose over a large boulder, to dip again to greater depth.

Little was found in the first ten feet of the digging, the midden material consisting of flint chips, an occasional animal bone or mussel shell, and numerous large snail shells (*Bulimus* sp.).

At 155–85 a cross section of the trench showed the following:

1″ to 4″—Surface deposit of small burnt stones, ashes, and tiny fragments of sotol leaves.


·Map of Fate Bell Shelter·
·Seminole Canyon·
·Val Verde County Texas·
·Legend·
Sotol Pits
Burials
Abrading Stones
Mortar Holes
Loose Rocks on Surface
1. Asphalt Pebble
2. Snail Shell Beads
3. Multiple Metate
4. Engraved Mussel Shell
5. Rabbit Stick
6. Corner-Tang Awl
7. Shaped Clay Object
8. Sewed Prickly Pear
9. Paint
10. Mussel Shell Rattles
11. Mano In Net
L-1
L-2
L-3
L-4
L-5
L-6
L-7
L-8
N
W
E
Scale of Feet
10 0 10 20 30 40 50

MAP III

4" to 18"—Layer of grass, intermixed with sotol or saw yucca (*Dasylirion texanum* Scheele) and lechuguilla (*Agave lechuguilla*) leaves, fragments of cordage made from lechuguilla fiber, small pieces of basketry and matting, snail shells, chewed lechuguilla quids, knotted sotol and sacahuisti (*Nolina texana* Watson) leaves, etc., etc.

18" to 34"—Ash deposit, with some burnt rock intermixed. No midden material.

34" to 44"—Yellowish earth intermixed with ashes and charcoal. Also some burnt rock. A few projectile points.

44" to 58"—Black deposit consisting largely of charcoal, with very few stones and no midden material.

58" to 62"—Yellow earth, undisturbed.

63"—Bedrock.

At 142–85, depth 26 inches, was a piece of limestone 2½ by 2 by ½ inches with black, shiny asphalt coating on one side and edge. At 142–80, depth 14 inches, was a pebble splotched with black paint. At 140–80, depth 11 inches, was what once may have been a grass bed. It consisted of a deposit of grass, somewhat tangled and mixed with fiber quids, a few prickly pear (*Opuntia*) leaves, small sticks, and miscellaneous rubbish. It averaged about twenty inches in width and was some five feet long.

At a depth of 15 inches, 139–79, were twenty-one snail shell beads (Plate XXVII b) on the original grass string. The stroke of the trowel resulting in discovery cut the fragile string. The shells were originally pierced with holes about one-eighth of an inch in diameter. The holes were broken through roughly and not drilled (Fig. 4).

At a depth of 27 inches, 160–78, was a double handful of woolly, soft, sponge-like material of yellowish color. It was found embedded in a mass of rubbish and was probably material prepared for twining into cordage. Dr. Gilmore reports on it, ". . . Soft, fibrous material, appearing to be perhaps fibers of *Apocynum* sp."[5]

A net, made of fiber cord, was found at a depth of 9 inches at 160–75. It is about one-fourth inch mesh, very rotten and fragmentary.

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[5]Melvin R. Gilmore, Report No. 57, Laboratory No. 554, University of Michigan, Museum of Anthropology, Ethnobotanical Laboratory, to the University of Texas Museum of Anthropology, February 17, 1933.

Figure 4. A necklace of twenty-one snail shell beads, on original grass string. Found in rubbish at a depth of 15 inches.

A digging stick, 29 inches long, sharpened at one end and battered at the other, was found at a depth of 11 inches, 161–74. The bark was peeled off, and the stick was well preserved.

At a depth of 8 inches, 160–74, was an article woven from sacahuisti grass, or so-called slender bear grass (*Nolina texana* Watson). The object is square in cross section, some four inches long, three-eighths inches on each side, and looks much like the pioneer "watch-fob" made by "square-plaiting" buckskin thongs. The use of this article is problematical.

A tied bundle of sacahuisti grass came from a depth of 12 inches, 160–73.

A large metate, or mortar-hole stone, 32 by 15 by 6 inches was uncovered at 145–70; depth 5 feet 11 inches. It bears seven pits on one side and one on the other. The pits are about three inches in diameter and one to three inches deep.

Figure 5. Suffocating dust arising from work in the trench made occasional pauses necessary.

A fire stick, or hearth stick, of split sotol stalk with charred pit showing use in making fire by friction, came from a depth of 11 inches at 155–70. At 154–64, depth 14 inches, was a piece of sotol flower-stalk 3¼ inches long and painted red at one end. A mussel shell paint container came from a depth of 8 inches at 152–64.

The nock ends of broken arrowshafts were found at depths of 5 and 6 inches at 148–68 and 160–65. A flint fist-ax (*coup-de-poing*) was found at a depth of 24 inches, 155–65. A fragment of a small gourd, generally referred to by pioneers as a "cymlin," came from a depth of 10 inches at 158–67. Three sticks tied with a grass string were found at a depth of 10 inches, 145–68. A prickly pear (*Opuntia*) leaf with a sacahuisti thong tied into it, for carrying or hanging, came from a depth of 15 inches, 147–63.

From a depth of 38 inches, 150–62, came a finely chipped flint knife, 3⅛ inches long, 1¾ inches wide at one end and tapering to a point at the other. It has three cutting edges. A projectile point of type No. 1 (Plate XII a) was found at a depth of 74 inches at 158–62.

A test trench into burnt rock or sotol pit No. 3 (see Map III) at 160 to 165–60 to 65, showed the following: From the bottom of

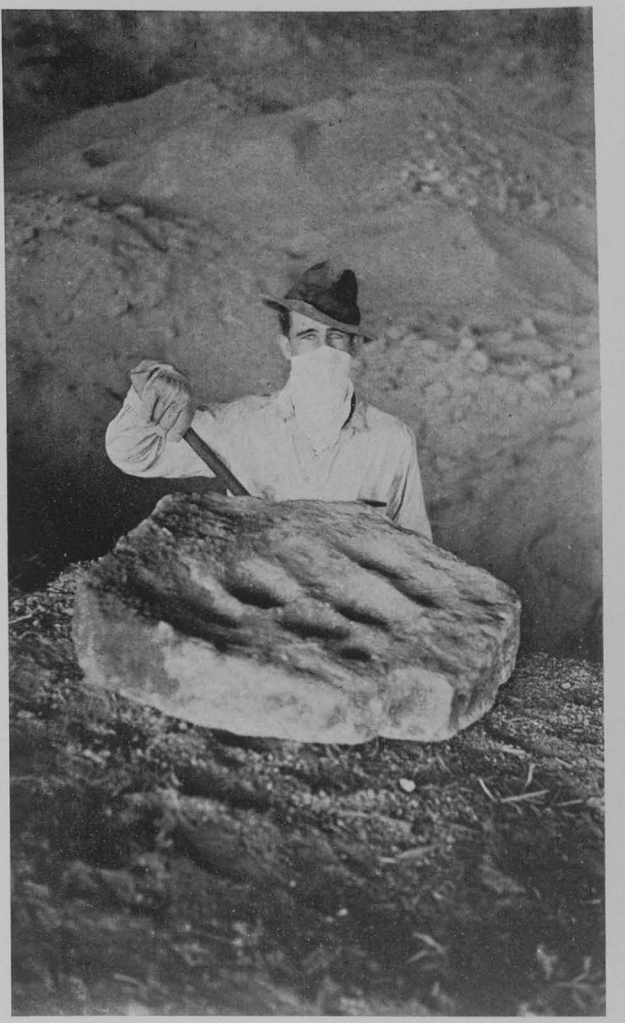

Figure 6. Large metate, or mortar rock, bearing seven pits all showing considerable use. Excavated at a depth of 45 inches. Size 34 by 28 by 5 inches.

the pit down 13 inches were white ashes intermixed with burnt rock, a few snail shells and fragments of sotol leaves. There were no artifacts. From 13 to 42 inches were yellow ashes, intermixed with burnt rock, snail shells, an occasional mussel shell, a few flint chips,

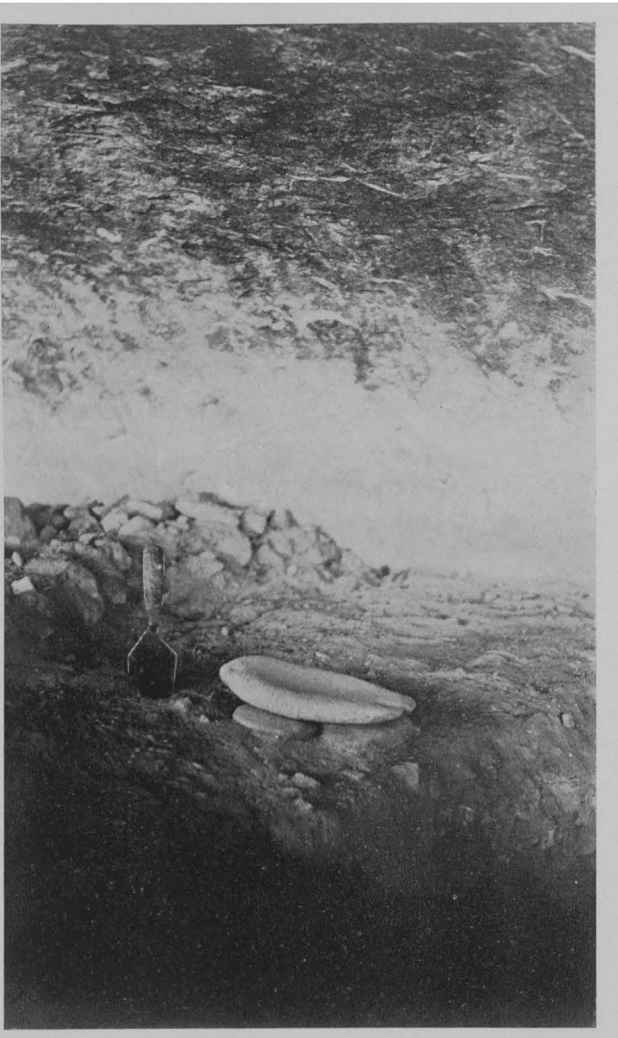

Figure 7. Small metate found resting on three well made manos at a depth of 3 inches. All of fine red sandstone. The metate is 10¾ by 6½ by 1 inches.

crude flint scrapers, painted pebbles, broken manos, and large crude projectile points. In other words, the contents of the deposit in and around the pit did not vary to any appreciable extent, except for the absence of the top deposit of dense midden material, from that in other parts of the shelter.

A cross section of the trench (Plate V) at 60 feet out from the shelter wall (140 to 160) showed as follows:

1″ to 17″—Deposit of camp refuse intermixed with general litter of grass, sotol and lechuguilla leaves, fiber cords, quids, sandals, fragments of matting and basketry, and an occasional flint artifact. A few bones and many snail shells.

17″ to 43″—Almost solid mass of burnt limestone rocks, with ashes intermixed. Also a few burnt snail shells and a few flint scrapers and manos. No matting, basketry, or cordage.

43″ to 53″—A stratum of almost pure ashes. Very few stones and only a few snail shells. Very few flint artifacts.

53″to 55″—Black, charred material, chiefly burnt sotol. No artifacts.

55″ to 62″—Stratum of brown ash. No artifacts.

62″ to 72″—About same as top stratum, except that the trash and other material is charred and of a blackish-brown color. Apparently scorched or "cooked" by the intense heat of long-continued fires located only a few inches above. A few burnt rocks intermixed with the midden material. Snail shells, cordage, bits of basketry and sandals from this layer are badly charred.

72″ to 84″—Burnt limestone rocks interlarded with brown ash. A few manos and flint scrapers. Also some snail shells and animal bones.

84″ to 106″—Mixture of brown ash and charred material. A number of large boulders on the original rock bottom. A few flint artifacts, manos, and a painted pebble from depth of 99 inches.

107″—Undisturbed limestone shale, having a yellowish color.

At 153–60, depth of 8 inches, was a fiber-cord net with a mesh slightly less than one-fourth inch; condition bad.

From a depth of 12 inches, 156–59, came the framework of a sandal made of split lechuguilla leaves. A large leaf was split 4 inches from its tip and bent around to form the sides, with the unsplit end running half way down midway between the sides. Short strips of split leaves were then laced under and over the framework, making the foundation for the sole of the sandal (Plate XVIII b).

A tiny sandal frame of the split-leaf type was found in the rubbish at a depth of 16 inches, 148–59. A crudely shaped ironstone ball, 2 inches in diameter, was found at a depth of 70 inches, 153–59.

A sandal was found in sotol ashes at a depth of 63 inches, 156–58; condition bad.

A cross section of the trench. Bedrock was reached here at a depth of 8 feet 11 inches. Evidence of human habitation extended throughout. The three levels show very distinctly at the left of the photograph. Note the boulders that fell from the roof in the early stages of occupancy.

Figure 8. Another cross section of the trench, showing the badly matted debris of the upper level, the ashy middle level, and the rocky bottom level.

Large Abrading or Whetting Stones

There was dug up, at a depth of 65 inches, at 140 to 143–56 to 57, a stone 36 by 13 by 10 inches. It is a "sandy" limestone that shows unmistakable signs of use as an abrading or whetting stone

Figure 9. An abrading or sharpening stone of "sandy" limestone, 36 by 13 by 10 inches, uncovered on bedrock at a depth of 65 inches. It probably was used for sharpening bone implements.

(Fig. 9). It was imbedded in a stratum of yellow ashes and has ashes and charcoal adhering to it. It was on edge and the side toward the east bore fifty-seven distinct grooves incident to rubbing pointed implements of some hard substance in them for sharpening. The grooves range in depths from 1/10 inch to ¼ inch and in length from 1 to 10 inches. There are also twenty-three pits, or circular depressions, on the two sides of the stone. These vary from ½ to 2 inches in diameter and ¼ to 1½ inches in depth. The pits may have been made in rounding off the ends of bones and sticks, while the grooves probably resulted from sharpening, or pointing, implements of bone such as awls and needles. This stone undoubtedly was used by the first occupants of the shelter, since it rested on bedrock.

A similar stone, at 145–52, depth 57 inches, bore only a few of the incised abrading lines.

On the surface, at the outer edge of the shelter, at 290–26, is a boulder of limestone that evidently was used in working down and polishing bone and wood implements. The upper surface of the stone is 60 by 37 inches. The entire surface is worn exceedingly smooth and some portions, around the rims of old eroded depressions, are as slick and shiny as glass. In addition, there are several

hundred grooves with sharp, well-defined edges. The depths of the grooves vary from 1/16 to ½ inch and the lengths range from ½ to 16 inches. The presence of numerous bone implements in the midden deposit explains the use of this stone (Plate VI).

Another surface boulder, at 265–36, has fewer grooves.

Miscellaneous Finds

At a depth of 12 inches, 150–56, was a crude chunk of limestone, about the size of a man's fist, tied into a split prickly pear (*Opuntia*) leaf. The stone was held in place by a sacahuisti (*Nolina texana* Watson) leaf thong. At 159–53, depth 15 inches, was a rabbit bone with sacahuisti grass tied around it.

At a depth of 18 inches, 155–51, was a mano bearing a coat of red paint on one side and upon the red a somewhat smaller area painted black, or blackened by use in grinding black pigment.

At 158–50, depth 10 inches, was a fire-drill of what seems to be black persimmon (*Diospyrus texanum*) worn slick by use and with both ends charred. The length is 20¼ inches and the diameter ½ inch. This diameter coincides with that of some of the pits in the yucca hearth sticks.

A carved pebble of hard sandy shale (broken) was found at a depth of 67 inches at 155–50. The scratched or crudely incised lines form a simple cross-hatch design. The pebble is carved on both sides, three of the lines running around the curved edge.

At a depth of 3 inches, 150–50, was a bundle of seven pieces of sotol stalks with a strip of skin wrapped around the sticks and a small cord net made of *Apocynum* fiber wound over the skin. The sticks are ½ inch in diameter and from 8 to 13 inches in length. The net, which is tightly wound around the sticks, is ¾ inch mesh. The larkshead knot (Plate XVII b) was used in its manufacture. This bundle may have been equipment for a snare.

Two inches below the last mentioned find was a wooden awl or "needle" with a string-slot, or groove, at the large end. The other end is somewhat sharpened.

At a 24-inch depth, 140–47, lay a large digging stick, sharpened at both ends. Its length is 31⅞ inches and diameter 1 inch. The entire stick is fairly well polished. The ends are slightly blunted

PLATE VI

A surface boulder of hard limestone with a polished area that contains many small grooves. The stone, with a top area of 60 by 37 inches, stands near the outer edge of the shelter. It was probably used to grind down and polish bone implements, etc.

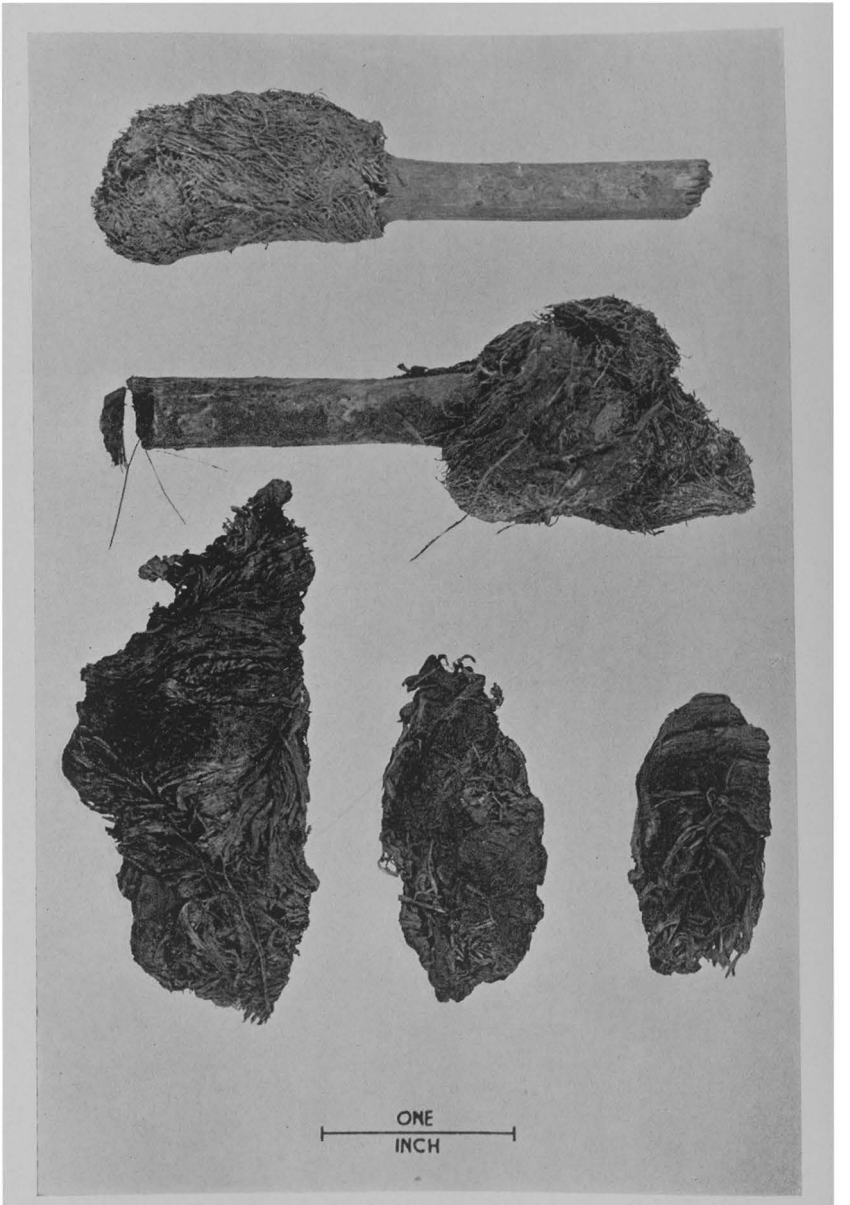

Figure 10. Quids resulting from chewing short pieces of a fibrous stalk, perhaps *Agave lechuguilla* flower stalks, when young and tender. Many of these quids were found intermixed with the debris in the upper level of the shelter. Some still have imprints of the teeth.

Figure 11. The low, stubby plants in the foreground are *Agave lechuguilla;* larger ones to the rear are sotol, or saw yucca (*Dasylirion texanum Scheele*). Fiber from the leaves of lechuguilla was used in making cordage. Leaves of both plants were used in the manufacture of sandals, mats, baskets, etc. The flower stalks were used for chewing when young and tender and for fire-making hearth-sticks when dry. The large crown of the sotol, from which the leaves emerge, was used as food.

and worn from use. The specimen shows no signs of having been hammered on either end, as is the case with certain other digging sticks recovered from other parts of the shelter. There is no groove at the center, such as might be expected in the case of a "hanging stick" for drying meat.

Buried Mortar Holes

At a depth of 58 inches, 155–43½, was encountered a mortar hole in bedrock. The hole is 18 inches deep. It is 7 inches in diameter at the top and maintains about the same size to a depth of 12 inches, when the diameter decreases to about three inches. At 9 inches southwest of the hole is another, somewhat smaller. The distance from the center of one hole to center of the other is 16 inches. The smaller hole is 12 inches deep and is 6½ inches in diameter at the top, maintaining the same size down 8 inches and from there decreasing to 2 inches at the bottom. The finding of a third mortar hole 19 inches west of the first one makes a triangular arrangement of the three holes. This feature is frequently noted in a study of

mortar holes in West Texas. The third hole is 18 inches deep and is 6¾ inches in diameter at the top, maintaining the same size down 15 inches, then tapering to about three inches at the bottom. There is part of a broken stone pestle tightly wedged in the bottom of the third hole. Possibly it was an attempt to elevate the bottom for subsequent use. Webb mentions such a case.[6] Hole No. 3 is 26 inches from the centers of both Nos. 1 and 2 (Plate VII).

The holes were full of yellow ashes, intermixed with some midden material, such as forms the bottom stratum at that point.

At a depth of 50 inches, 148–39, a fourth mortar hole was discovered. It is 15 inches deep, 6½ inches in diameter at the top, and continues the same size down to 11 inches from which point it decreases to 2½ inches at the bottom. In the bottom of the hole was a yellowish deposit consisting of about one quart of small western walnuts, crushed.

In identifying the mass of material found in the bottom of the fourth buried mortar hole, Dr. Gilmore, a specialist in ethno-botany, writes:

> A quantity of tiny fragments (from 1 mm. to 5 mm. in diameter) of shells of the Texas walnut, *Juglans rupestris*. This material was recovered from the bottom of a mortar hole in the bedrock in a rock shelter. The Texas walnut itself is very small, only about 15 mm. in diameter. They are too small to crack and extract the kernels as we do hickory nuts and black walnuts; nevertheless, the aboriginal people utilized them for food. This was the process: The nuts were crushed very fine in stone mortars; then the crushed mass was boiled in water to extract the oil. When the oil rose to the top of the water it was skimmed off and stored away for use in cooking.[7]

The presence of these buried mortar holes is of particular interest in throwing light on the length of time the shelter was occupied. It is generally conceded that wearing mortar holes to the depth of these must have taken a relatively long time. After the period of use had elapsed, the holes were abandoned; then passed another period of sufficient length to result in the covering of the holes with a deposit of camp refuse to depths of 50 to 58 inches. This seems to indicate considerable age for the material found at the bottom of the shelter's deposit.

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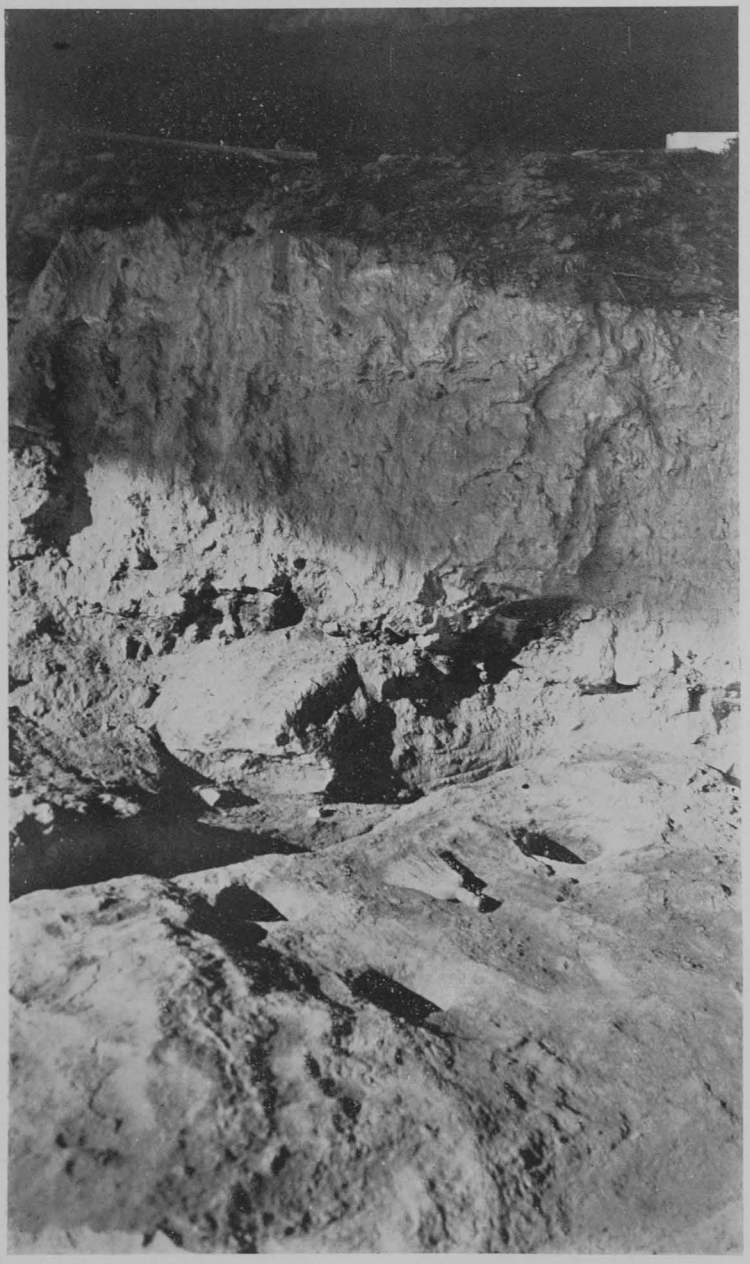
[6]W. S. Webb and W. D. Funkhouser, "So-called Hominy Holes of Kentucky," *American Anthropologist*, N. S. XXXI, 705.

[7]Gilmore, *op. cit.*



Three mortar holes in bedrock, uncovered at a depth of 58 inches. They are located 155 feet from the south edge and 43 feet from the wall of the shelter. These holes have an important bearing on a determination of the age of the midden deposit. Note the wall of the trench.

Engraved Mussel Shell

At a depth of 40 inches, at 143–32, was an engraved mussel shell bearing delicately carved designs on the interior. These take the form of two parallel rows of hatched diamond-shaped figures. The shell is 4 inches long and 2½ inches wide. Around a portion of the edge are a number of tiny notches, possibly made for record purposes (Plate VIII a). This is the only carved shell found, although a conch shell gorget (Plate VIII b), with five drilled holes but otherwise undecorated, accompanied one of the burials.

Cross Section of the Trench

At 140–30 a cross section was as follows:

1″ to 18″—"Trash" deposit, chiefly of vegetable matter, consisting of a mass of sotol leaves, grass, twigs, yucca stalks, ashes, sandals, snail shells, fragments of basketry and matting, pieces of fiber cords, quids, bone awls, an occasional mano, and projectile point. This is typical of the upper level.

18″ to 24″—Small stones, gravel and charcoal, intermixed with white ashes. Very few artifacts of any kind. Bottom portion of the upper level.

24″ to 37″—Ash deposit (white) containing a few small stones, snail shells, bird and small animal bones. Contains bone beads, manos, many flint artifacts, and a few bone implements. Typical middle level.

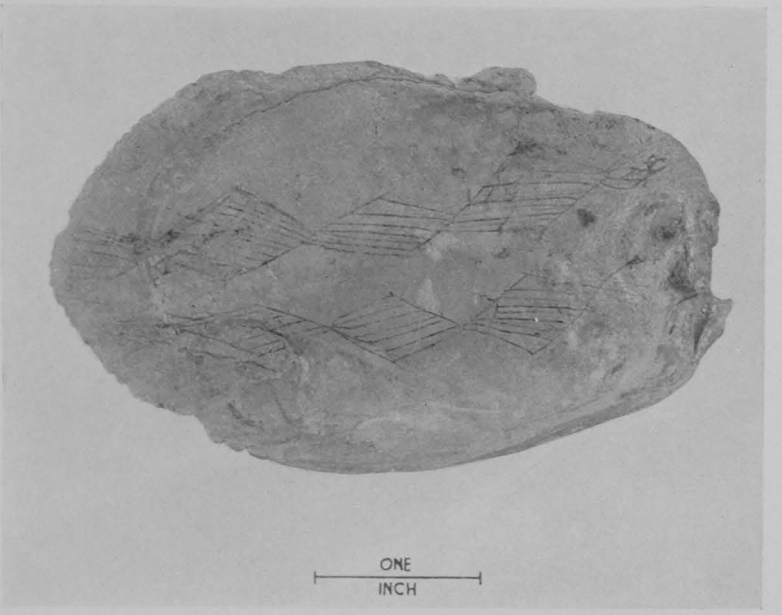
37″ to 45″—Cement-like floor of middle level, made up of packed ashes (brown), intermixed with stones about the size of a man's fist. Practically no artifacts and very few snail shells or bones.

45″ to 82″—Mixture, in about equal parts, of brownish-yellow ashes and small stones. Contains hundreds of snail shells, small animal bones, bird bones. The artifacts are confined to very few projectile points, an occasional metate and mano. Streaks of burnt sotol leaves. Typical bottom level.

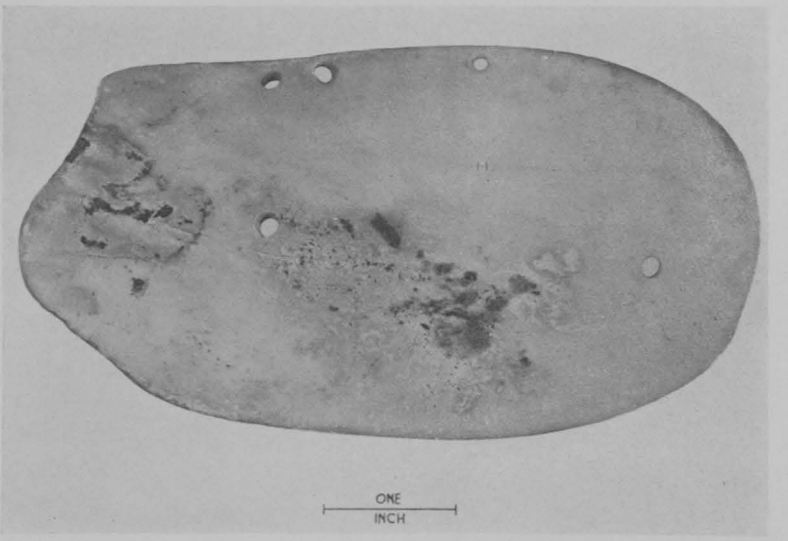
82″—Bedrock.

Carved Rabbit Stick or Grooved Club

A carved "rabbit stick," or grooved club, 14 inches long, was found at a depth of 14 inches, at 145–30. It has the usual curve and bears the customary three grooves running lengthwise on each side. The width varies from one to one and a half inches, and it is about one-half inch thick. The club shows much use and appears to have had one end broken off and to have been again roughly shaped (Plate IX a). Several other short fragments of rabbit sticks were unearthed in various parts of the midden deposit.



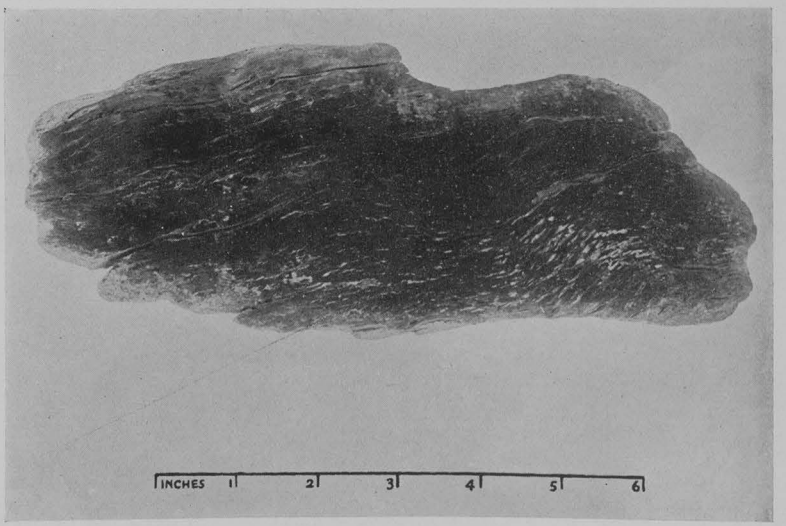
(a) Engraved mussel shell, from a depth of 40 inches in the midden deposit. Note notches around the edge.



(b) Conch shell gorget from burial L-8 at a depth of 49 inches. Found about 12 inches southwest of the skull.

PLATE IX

(a) Rabbit stick, or grooved club, found in the debris of the upper level.



(b) A wooden shovel, or scoop-like implement, charred on one side. Such implements are typical of the Basket Maker culture.

Unusual Flint Artifacts

A so-called "corner-tang awl or drill," chipped from flint, was found in screening the ash deposit at a depth of about thirty-six inches, 142–29. It was found in two pieces and in separate screenfuls of ashes, some ten feet apart, but at approximately the same depth. There can be no question about the pieces belonging to the same implement.

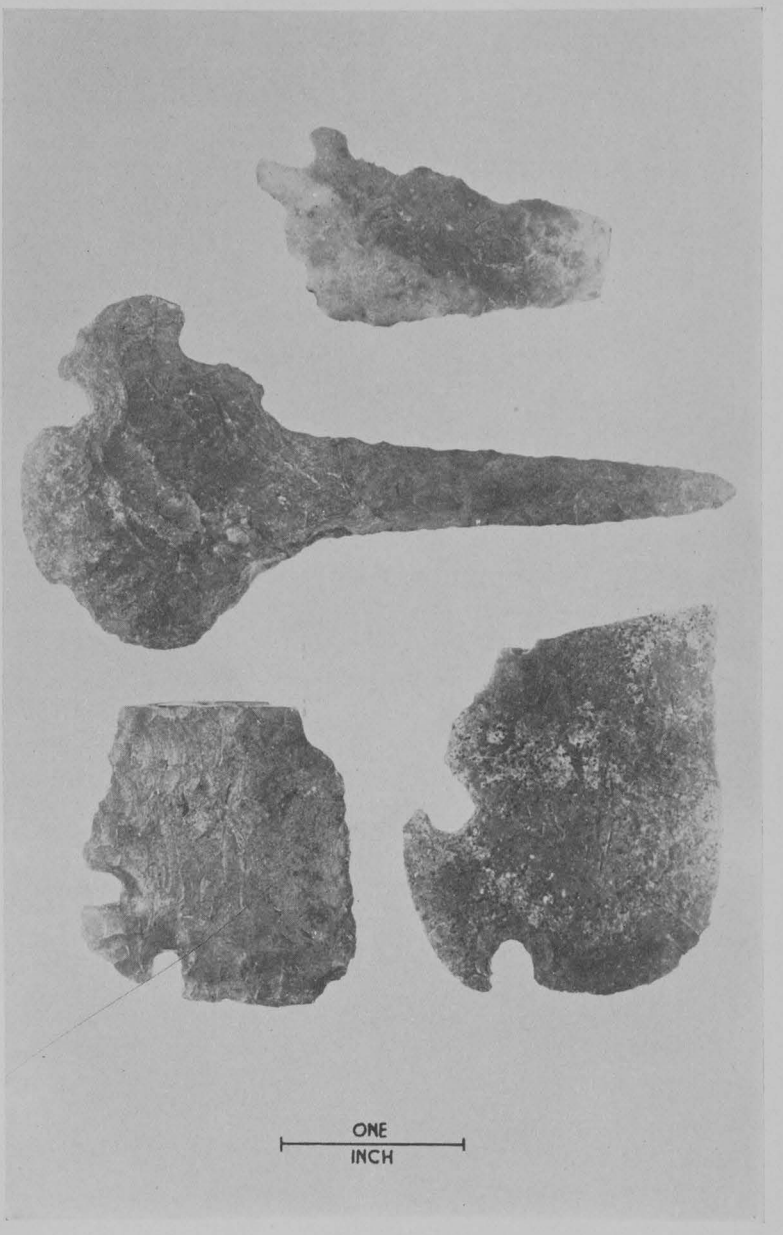
The lower ends of three other such flint knives or awls, bearing pronounced corner-tangs, were found in screening. The largest of these, with the tip or point broken off, came from a depth of 20 inches, at 143–15.

These corner-tang implements (Plate X) are strikingly like some seventy-five specimens that have been found in Central Texas within a radius of fifty miles of Austin. We had heretofore considered them peculiar to Central Texas; but since we found four in this rock shelter, and heard of three others, it would seem that they are not uncommon to the Pecos region. In Central Texas they have often been formed by chipping a tang on the corner of a triangular blade; hence the term "corner-tang" applies in describing them.

A Shaped or Molded Block of Clay (?)

At a depth of 26 inches, 154–24, was a hard, stone-like object, 2½ inches wide, rounded at one end and broken at the other, with a remaining length of 2 to 2½ inches and a thickness of ½ to 1⅛ inches. The bottom is flat and the top side bears two grooves, which appear to have been made by human fingers, or a round stick, in the material while it was in a plastic condition (Plate XI a). Dr. E. H. Sellards, Bureau of Economic Geology, The University of Texas, says it is not a fossil but is a "made object." It looks like sun-baked or partly fired clay, or ground shale and lime. There is no sand, but there seem to be a few tiny traces of shell tempering material. The specimen is of a blackish, slate-like color. If this be pottery, or shaped clay, it is the only fragment of such discovered in the shelter. No potsherds were found.

PLATE X



Flint knives and awls bearing corner-tangs. These implements are strikingly like certain specimens from the burnt rock mounds in the Central Texas region.

Unusual Wooden Implement

At a depth of 15 inches, 149–24, was a wooden implement which we call, for lack of a better name, a needle. It is 30 inches long and with a diameter of from ⅛ to ¼ inch. At the worked end there is a V-shaped hook, made by cutting off a branching limb a short distance from the main stem, and then cutting off the main stem about an inch below its junction with the branch limb. The portions forming the "V", together with the slight extension beyond, are carved or rubbed down on each side to about one-half their original thickness. The upper end is unworked except for a slight rounding of the tip. Its use is problematical but it may have been used in net weaving.

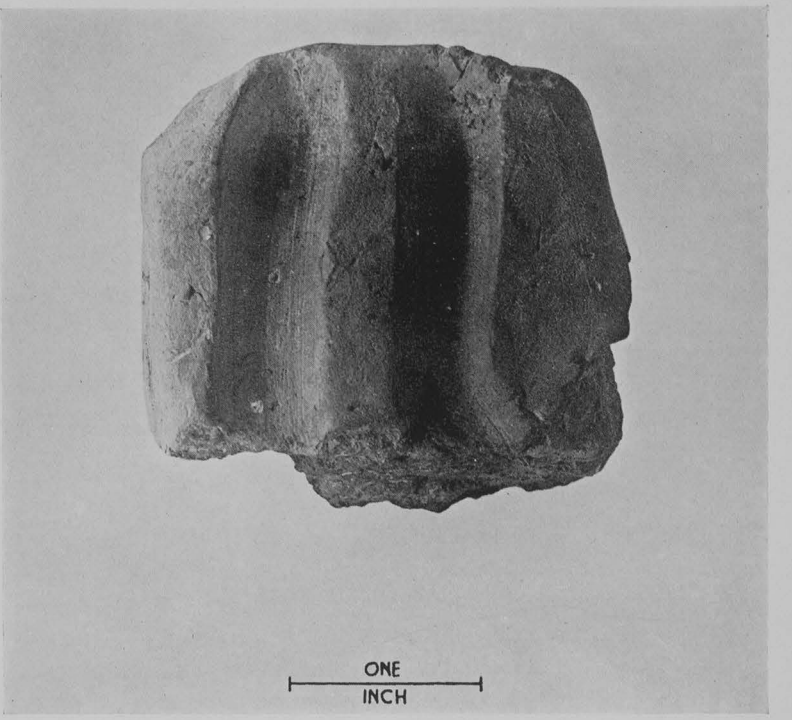
Upright Stakes

At 141–22 to 24, depth 12 inches, the tops of upright stakes were encountered. To the west was a single stick, and 26 inches to the east were two other sticks, side by side. A bent sotol stalk, split in half but bearing no fire-pits, was tied in a bundle with two other shorter sticks. The bundle lay at right angles to, and rested against, the single upright stake. A bunch of grass lay immediately above the bent sotol stick.

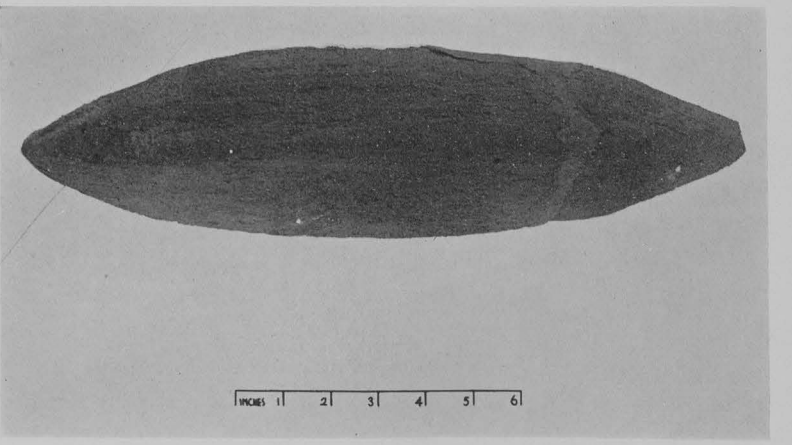
A very similar set of stakes was found at 142 to 145–20; depth 21 inches to the bottom of the stakes. The single stake was to the north; 29 inches to the south of it were two stakes, side by side. The tops of the stakes, some six inches beneath the surface, are charred; the bottom ends are crudely chopped off. All are about one inch in diameter. A split and bent sotol stick, 13 inches long, with a bunch of charred grass above it, lay just to the south of the group of two stakes. At the base of the vertical stakes was a layer of hard-packed ash.

It will be noted that the stakes in each set were slightly over two feet apart; each consisted of a single stake at one extremity and two at the other; the lengths of the stakes range from 13 to 15 inches; the tops of the stakes are charred; a split sotol stalk about one foot long, with some grass, accompanied each set. These striking similarities in arrangement, and the fact that they were near together, would seem to indicate that the sets of upright stakes served some

PLATE XI



(a) Shaped clay-like object, found in the midden deposit at a depth of 26 inches.



(b) A bar of limonite, or yellow ocher, from a depth of 26 inches against the wall of the shelter. The bar appears to have been molded from ground ocher. Pictographs painted in yellow suggest the use of this ocher as paint.

definite purpose. Both were in deposits of ashes, but whether or not they had any connection with fire-making is problematical.

Certain amateur diggers report finding metates in that vicinity with stakes driven down on two sides, as if to keep the metate from moving while in use. But no metates were found near these groups of upright stakes, and there seems to be no connection between their use and those reported by the diggers.

It is possible that a stick, such as several so-called digging sticks found elsewhere in the shelter, may have been weighted down at the base of the double stakes and lashed to the top of the single stake, as a means of drying or cooking meat over a fire.

Bone Implements

At least 95 per cent of the numerous bone implements came from the debris of the upper level.

At a depth of 6 inches, 152–23, was a small bone implement with a V-shaped notch worked into one end. The edges of the "V" had been worked fairly thin, so that it might have been used in making fiber cord nets or in weaving (Fig. 12 c).

A small crude bone implement of the spatula type had wrapped around it several strands of sacahuisti (*Nolina texana* Watson) grass (Fig. 26 a). It was found at a depth of 9 inches, at 144–22.

Four small bone needles and a bone gouge were found in the trash of the upper level, also four possible fish bone needles. A fragment of an unusual implement was that of a bone "arrowshaft polisher and straightener" (Fig. 12 b). It showed much use, the drilled hole for receiving the shaft having attained a high polish. A bird bone bearing a drilled hole suggests its use as a whistle or call (Fig. 12 a).

A number of highly polished bone awls were found in the trash covering the upper 15 inches of the shelter (Fig. 13). A few came from the middle and lower deposits. One of the longest of the awls, 6⅞ inches in length, came from a depth of 12 inches, at 158–14. The sizes of the awls vary from 3¼ inches long and ¼ inch wide to 7⅛ inches long and 1 inch wide at the upper end. A few of the awls have been worked to fine, long, narrow points.

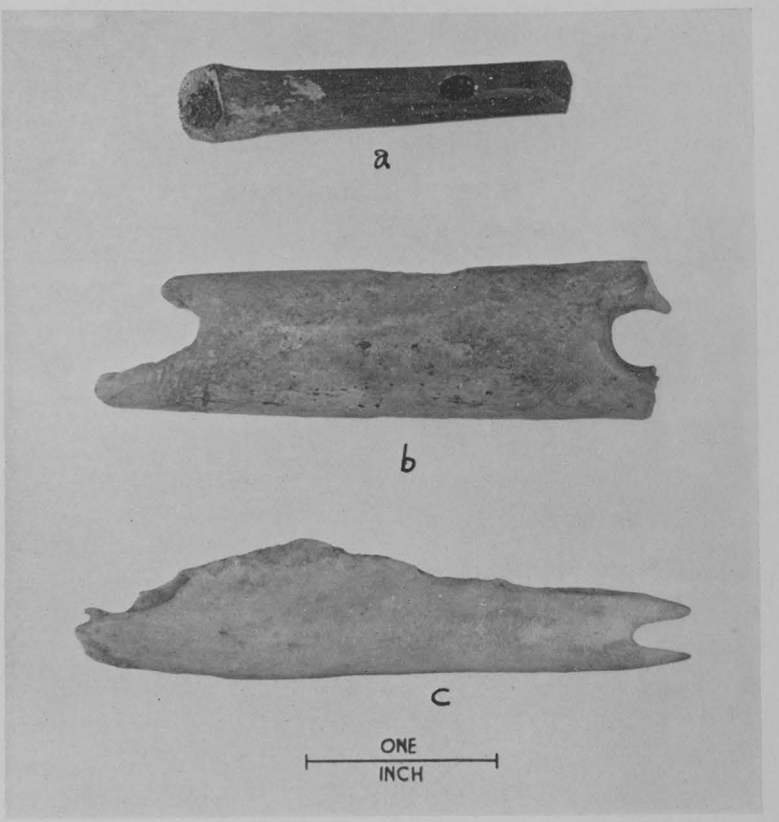


Figure 12. Problematical bone implements. The top one may be a whistle; the one in the center, an arrowshaft straightener; and the lower one, a weaving or net-making tool. Length of bottom specimen, 3¼ inches.

Several partly completed specimens were found showing the various stages of manufacture. Of fifty-three bone awls found, thirty-five are in perfect condition.

Many of the awls appear to have been made from the cannon bone of the deer. Others were made from the split scapula of the deer. Two punches, or awls, with sharp points, were made from the ulna of the deer, as were thirteen other implements of similar design except that they had rounded ends and are classed, therefore, as flaking tools.

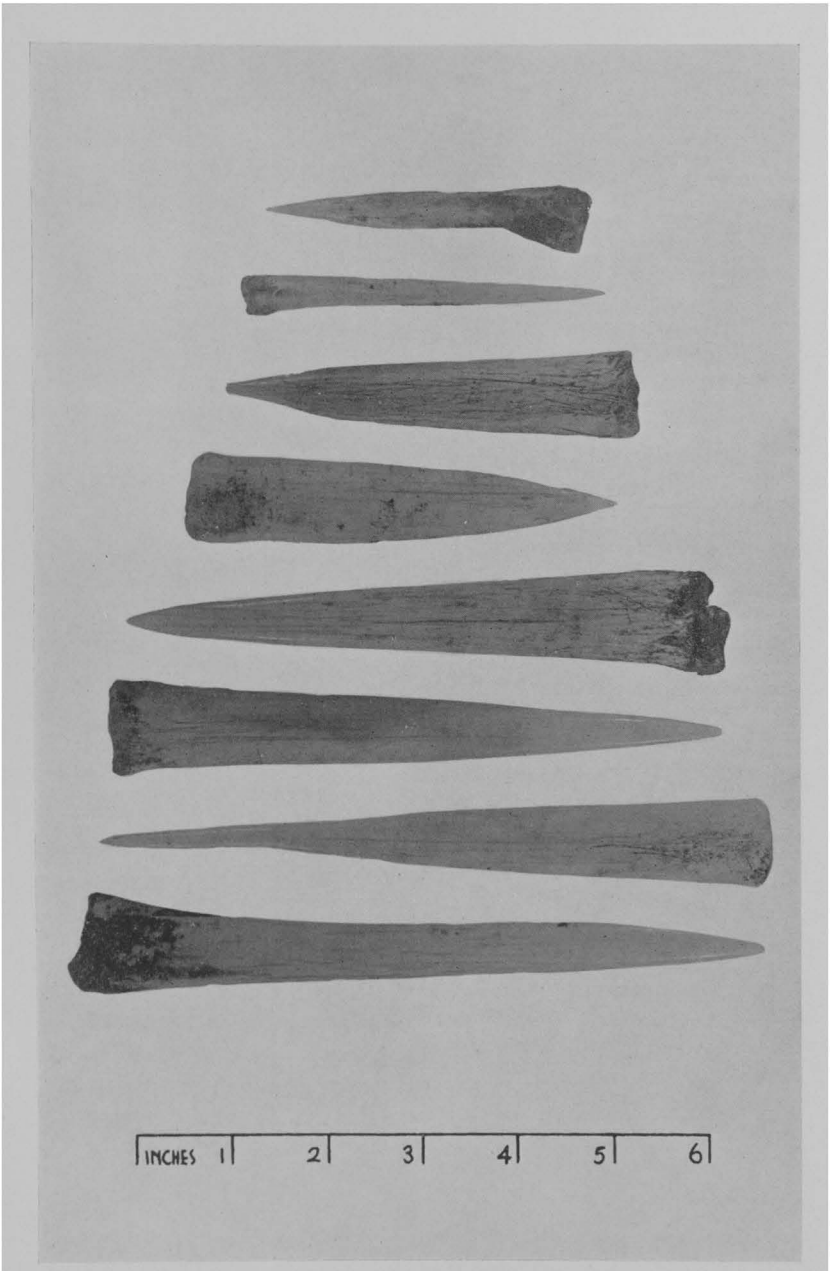


Figure 13. Bone awls found in the debris of the upper level. They have sharp points and are highly polished. Note the long, narrow point on the second awl from the bottom. Longest, 7⅛ inches.

The awls from this shelter are much like those found in West Texas, New Mexico, and Arizona, but are quite different in shape and size from those of Central, South, and East Texas. The awls are also much more numerous in this shelter than in the three last named regions; this, however, may be due largely to the greater rainfall and lack of protection from the weather in those regions.

Antler Implements

Thirteen antler implements were found. Among these was a section of antler 5 inches long and 1¼ inches in diameter worn off at each end; another 2½ inches long and 1⅛ inches in diameter was shaped in the same way. It would seem, since these two specimens were "cut and rubbed smooth at the ends," that they may have been used as pestles[8] or as polishers.[9]

There were five antler flaking tools, three of which consist of tips ranging in length from 3 to 4½ inches and two of which were split and ground down. All show considerable rough use on one end.

Six of the specimens were split and worked into gouge-like implements. They range in length from 2½ to 4½ inches and in width, at the split edges, from ¾ to 1 inch. The inner surface has been smoothed to a polish, while the outer surface is convex and unfinished. One end was rounded off by use. One of these specimens, 4 inches in length, was worked down on one end, as if to permit a better grip in the hand or to facilitate hafting.

Sewed Prickly Pear Leaves

At 151–19, depth 9 inches, was a deposit of grass, immediately beneath which were twenty-two prickly pear (*Opuntia*) leaves. Three pear-leaf basket-like receptacles were made by sewing together the upper edges of two leaves in each case. The sewing was done with an overhand loop stitch of sacahuisti grass. The other pear leaves in the deposit were not sewed. No spines remained on the prickly pear leaves.

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[8]E. F. Coffin, "Archaeological Exploration of a Rock Shelter in Brewster County, Texas," *Indian Notes and Monographs*, No. 48, 1932, Museum of the American Indian, Heye Foundation, p. 33.

[9]F. W. Hodge, "Hawikuk Bonework," *Indian Notes and Monographs*, III, No. 3, 1920, Museum of the American Indian, Heye Foundation, p. 114.

Packed Earthen Floors

A packed earthen floor was encountered at a depth of 11 inches and another at 28 inches in the trench from 140 to 160–5 to 10. There was no such floor in the five-foot strip adjoining the shelter wall. These packed floors average 4 inches in thickness, and are made up of ashes, dirt, tiny fragments of limestone, and flint chips. The entire mass was cemented together, making a floor almost as hard as concrete. The floor apparently was dampened and tramped in order to pack it.

Very few flint artifacts were found above the first floor; a few more were below the first floor; but the greatest percentage came from beneath the second floor.

At a depth of 28 inches, at 140–5, was discovered nearly one-half of what resembled an extremely crude earthenware vessel, consisting of a mixture of mud, ashes, gravel, and small flint chips. The thickness varies from ¼ to 1 inch. The rim-like edge flares outward about an inch. The depth of the would-be "vessel" was about five inches and the diameter not much less. The object cannot be classed as pottery. It may have resulted from a small basket being imbedded into the cement-like floor while the latter was still plastic.

Paint

At depths of 26 and 32 inches, against the wall of the shelter, at the 145-foot line from the south, were uncovered two unusual pieces of limonite, or yellow ocher. The one from a depth of 26 inches was broken and shattered at the edges of the break, but is about fourteen inches long (Plate XI b). It is triangular in cross-section and comes to a point at each end. Two other features of interest are: (1) The bottom side is flat, while the other two sides are slightly convex; (2) one side has four shallow grooves, or depressions, running lengthwise. The grooves are about one-fourth inch wide and suggest wear by a fiber brush, the edge of a pebble, or the end of a round stick. The other bar of ocher is of the same shape, slightly smaller, and without grooves. The presence of pictographs of a mustard-yellow color would indicate that these bars of ocher, of the same color, were to be used as paint.

The unusual shape of these bars of ocher seems to suggest something in common with certain finds in Utah, made by Nusbaum and described by Kidder and Guernsey:

> There were found several specimens of yellow and red ochres of varying degrees of brightness, and a few of pure white gypsum; these were evidently used as paints. The materials had been ground to powder, mixed with water, and then molded in the hands into cakes of various sizes and shapes, oval, cylindrical, or round.[10]

This seems to shed light on the origin of the two long bars of yellow ocher. They may have been molded into their present shapes.

In addition to the two shaped bars of ocher, one lump of orange-colored ocher and ten lumps of various sizes of red ocher, or hematite, were found.

Among the rubbish was found a charcoal "pencil" that showed unmistakable signs of use.

Burial L–1

Burial numbers at this site are preceded by the key-letter "L".[11]

At 151–18, depth 18 inches, a rough limestone rock about 12 by 10 by 3 inches was uncovered. Immediately beneath the stone was a small bundle of bent brush or limbs, the largest twig of which was slightly over one-fourth inch in diameter. The brush was not identified by Dr. Gilmore. Just below the brush was a mat, made of sacahuisti (*Nolina texana* Watson) plaited in the two-over-two-under diagonal weave technique. This was folded over an infant skull. Accompanying the burial and placed over the abdomen was a remnant of a small skin pouch, badly decayed and extremely thin. In the dust surrounding the burial were small pieces of charcoal, a

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[10]J. L. Nusbaum, "A Basket Maker Cave in Kane County, Utah, with Notes on the Artifacts by A. V. Kidder and S. J. Guernsey," *Indian Notes*, 1922, Museum of the American Indian, Heye Foundation, p. 138.

[11]By reference to Map III and by noting the location data for the first three burials, it will be seen that Nos. 1 and 2 were nearer the wall than No. 3. This was due to the following: The entire crew originally started work at the outer edge and worked inward; but after a time it became necessary to split the crew because of wind and dust conditions. Two men accordingly began at the wall and worked outward to meet the other workmen. The ones working in the rear part of the shelter encountered two burials before No. 3 was found by the other diggers.

mesquite (*Prosopis glandulosa*) thorn branch, and a small quantity of grass. There were no other artifacts.

The skull bones are very thin and the other bones extremely small, which would seem to indicate a very young child, possibly a premature or still birth. The skull was to the east, facing west, and somewhat crushed by the weight above; other bones were in a fair condition. There remain over the eye sockets what appear to be patches of skin.

The tiny skeleton was brought into Austin in its original wrappings, along with the brush which covered it.

Due to our lack of equipment necessary for supplying artificial light, the photograph of the burial in the ground was a failure.

Immediately beneath the burial was the pounded or packed ash floor. Several small limestone slabs rested beneath the east edge of the burial. It was 24 inches from the present surface to the bottom of the burial. The top of the burial, although 18 inches deep, was only 4 inches below the trash deposit of the upper level. The burial occupied a roughly circular area approximately twelve inches in diameter.

There is a bare possibility that originally the infant was placed in the skin bag. The small size of the remaining portion of the bag, however, would seem to preclude such possibility.

Hundreds of snail shells were in the ashy dirt adjoining the burial, but they may be the result of subsequent camp life and bear no relation to the burial.

Burial L–2

At a depth of 57 inches, 148–24, were fragments of what appeared to be the bones of an infant; pieces of ribs and pelvis were obvious. Slightly to the east were tiny fragments of skull, and to the west was a badly decayed femur. Due to the depth, a certain amount of moisture had arisen from below and had caused the bones to be in an advanced state of decay. The femur was 7 5/16 inches long.

One limestone rock was lying over the leg bones and another over the skull.

No artifacts accompanied the burial. If, originally, there were such things as mat or baskets they had completely decayed and had left no trace.

The length of the grave was about twenty-nine inches. The width was uncertain. Approximate measurements would locate it as 147 to 148½–22 to 25. Judging from such bones as remained, the bearing was ten degrees south of east. The original position of the skeleton could not be determined definitely.

The burial was on bedrock with yellowish-brown ash deposit above it. At that point the floor sloped to the eastward, the result being that the head was lower than the feet.

All evidence seems to indicate that this was an old burial, made by the first occupants of the shelter.

Burial L–3

Depth: To stone covering, 21 inches; to brush covering, 25 inches; to bottom of grave, 29 inches.

Location: 145 to 148½–44½ to 48½.

Bearing of head: Uncertain.

The top covering of the grave consisted of thirteen limestone rocks, varying in size from 4 by 3 by 1 inches to 15 by 10 by 6 inches. They were not arranged in any systematic order, but formed a rough circle slightly less than forty-eight inches in diameter (Fig. 14).

Above the actual grave covering was a deposit of trash and midden material 16 inches deep and above this was a 5-inch stratum of white ash, intermixed with a few small pieces of burnt limestone.

Beneath the grave covering of stones were pieces of brush, the limbs varying in size from one and a half inches in diameter to mere twigs less than one-fourth inch. One limb was protruding 25 inches beyond the deposit of stones.

The east and north sides were closely covered with stones, while the center, south, and west had considerable space not covered by stones. Immediately beneath the stones, and intermixed with the brush, was a deposit of about two inches of grass, sotol leaves, and lechuguilla fiber.

Fiber cords and fragments of matting were found just below the deposit of brush. Snail shells were unusually plentiful just above and around the circular deposit of stones.

Despite all these evidences of a burial, not a trace of skeletal material was found. But the situation here encountered corresponds

Figure 14. Burial L-3, partly uncovered, showing the arrangement of limestone rocks on top of the brush. Note the strands of fiber cords over the ends of two of the stones.

so closely with that of L–1, a known human burial, that it seems probable that this was a child's grave and that the skeletal material had completely disintegrated or had been removed by some agency.

Depths of Midden Deposits

The present surface of the occupied portion of the shelter is fairly level, except for a gradual dip toward the front and rear. But the trench, from the outer edge to the rear, disclosed the fact that the original floor, or bedrock, was uneven at certain points. That fact resulted in considerable variation in the depths of the midden deposit at the respective distances from the wall. The shallowest place, the outer edge, was 2 feet deep; the deepest, near the center, 8 feet 11 inches, with an average depth of 5 feet 10 inches. The depths at various points were as follows:

Distance from Wall, in Feet	Depth of Deposit, in Inches
0	48
25	57
30	83
47	85
56	65
60	107
65	99
70	92
85	63
90	46
98	24

Additional Trenching

When the twenty-foot trench was completed from the outer edge to the wall of the shelter we decided to make additional tests. Since experience had indicated that, from the standpoint of burials and artifacts, the richest portion of the shelter usually was near the rear, we trenched north and south along the wall (see Map III).

A trench was started at 140–15 to 20 and run southward until it intersected the shelter wall at points 85 to 90. In the first 7 to 10 feet of this trench bone awls, sandals, cordage, fragments of basketry, matting, etc., were uncovered. But the top stratum containing such artifacts gradually grew thinner until, at 125–17, it practically disappeared. The depth to bedrock at that point was 50 inches. Ashes, a few animal bones, snail shells, and an occasional flint artifact occurred down to bedrock. The farther south the trench continued, the fewer were the specimens.

At 120 to 115 a trench was run west to the wall. There were no finds of interest.

Burial L–4

On the afternoon of November 10, 1932, a trench was started at 450–0 to 5, this being the northern edge of the occupied area of the shelter. Burial L–4 was soon found.

Depth: To stone covering, 22 inches; to brush covering, 26 inches; to bottom of grave, 32 inches.

Location: 440 to 442–3 to 5.

The grave, which was almost circular, measured 24 inches across. It was discovered by finding the ends of brush protruding beyond the stones. Its arrangement was almost identical with that of burial L–1.

Accompanying the burial were the following:

Remains of a mat made of a triangular grass (*Carex* sp.) held together by fiber cords piercing the grass stems.

Fragmentary mat made of sotol (*Dasylirion texanum* Scheele) leaves, employing the over-one-under-one checker-weave technique.

A small mano stone, showing much use.

A fragment of skin.

A small flint scraper.

Approximately 100 snail shells.

A few fragmentary and charred bones.

There was nothing in the grave that could positively be identified as human skeletal remains. Yet it would seem, both from the accompanying artifacts and the similarity of arrangement to that of burial L–1, that this was a human burial. Possibly it was a cremated burial, though the charred bones may have been those of some animal or bird, the presence of which in graves has been found elsewhere.

Nature and Contents of Wall Deposit

The deposit along the wall at the north side of the occupied area of the shelter was as follows:

The upper 8 inches consisted of loose burnt rock intermixed with ashes. An occasional mano and projectile point were found. From 9 inches on down to bedrock, a depth of 32 inches at 442–0, the

deposit is almost pure ash of a whitish-brown color. It contained a few metates and projectile points, and an occasional painted pebble.

At 425–5 the depth to bedrock was 61 inches with all but the few upper inches being homogeneous ash deposit. In the ash a well made flint ax (Fig. 15), a metate, and an arrowpoint were found. The ax, depth 54 inches, had the lower end chipped to a sharp cutting edge; the upper end was shaped for hafting, probably by insertion into a socket gouged in a wooden handle.

At a depth of 3 inches, 417–3, was a cache consisting of three manos of the sharp-edge type and a small metate (Fig. 7). All are of a hard, red sandstone. The metate has a worn depression on each side; the manos show much use, are flat and worn to an edge at one side. The manos were arranged in triangular figure. Immediately on top of them rested the metate, which measures 10¾ by 6½ by 1 inches. The manos are 4 to 5 inches long, 3½ inches wide, and ¾ to 1½ inches thick.

At a depth of 36 inches, 412–3, was a well shaped, carved stone, 8 by 4 by ½ inches. The two flat sides reveal dimly carved, or scratched, lines spaced about one-fourth inch apart and running lengthwise. A few run across at an angle of forty-five degrees. There are also dim traces of black paint in spots on the stone, indicating that it was at one time painted and perhaps subsequently carved or scratched.

At 410–1, depth 24 inches, was discovered a short notched hardwood shaft, undoubtedly an atlatl foreshaft (Fig. 29 a). It is strikingly like those reported from Brewster County, Texas, and Kane County, Utah.

An unusual flint artifact was found at a depth of 39 inches, at 411–1. It bears evidence of having once been crudely chipped and later having had the conchoidal fractures worn smooth by rubbing or by some other treatment. It has the general shape of a scraper. Two other similar specimens of polished flints from depths of 16 and 27 inches were found in the shelter.

At 410–4, depth 18 inches, was a deposit of twenty-three prickly pear (*Opuntia*) leaves underlaid with a mass of grass. None of the leaves was sewed. The deposit had a depth of 5 inches. Mixed with the grass were two artifacts: a broken flint spearhead and a badly worn sandal of sotol leaves.

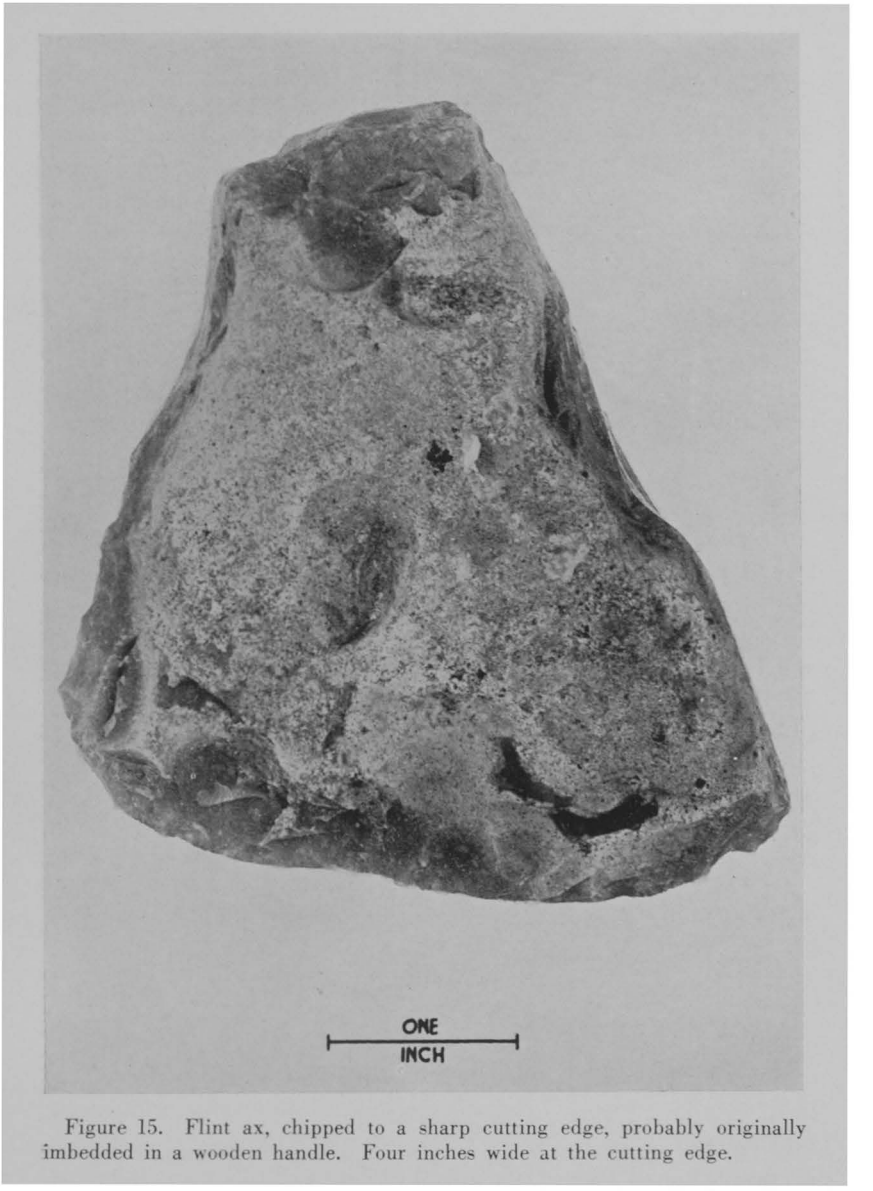

Figure 15. Flint ax, chipped to a sharp cutting edge, probably originally imbedded in a wooden handle. Four inches wide at the cutting edge.

This was the second cache of prickly pear leaves found; the other, previously mentioned, was in the main trench. Both were in association with grass.

Burial L–5

At 394 to 396–½ to 3, and at a depth of 14 inches, was a badly decayed mat made of triangular grass (*Carex* sp.) strung on large fiber cords. In its present condition the mat seems to have been originally at least 29 by 16 inches in size. It rested on top of a layer of brush. In removing the brush, two projectile points, a number of snail shells, two fiber quids, and several small bones were found. There was also a piece of sotol matting, about 5 by 9 inches, just beneath the grass matting. Small limestone slabs rested above and beneath the limbs and matting. The burial was in a deposit of ashes and small burnt stones. This find has quite a resemblance to burials L–3 and L–4.

Mussel Shell Rattles

At a depth of 42 inches, 391–3½, was a cache of five sets of hinged mussel shells, each set pierced with a hole ⅛ inch in diameter. The hole in each valve was located near the edge and ½ inch below the hinge (Fig. 27). The shells were badly burnt, and two of them crumbled when touched. The others were immediately treated with a preservative of celluloid cement, amyl acetate, and acetone. The position of the shells when found would seem to indicate that they were originally strung, perhaps for use as rattles. Any cord or thong that may have been through the holes would, of course, have been consumed by the fire that charred the shells.

At 387–0 the depth to bedrock was 62 inches, but at 355–0 the depth was only 33 inches.

Mano Wrapped in Net

At a depth of 6 inches, 376–2, was a large, well shaped mano, or rubbing stone, around which was a fiber-cord net (Fig. 16). The mano is 6 inches long, 5 inches wide, and 2 inches thick, with edges rounded and worn smooth. The net is of small mesh, averaging about one-fourth inch. The weave was worked out by a series of loops. A hole in the net had been repaired. To close the opening in the net, it was gathered together and tied, leaving about two inches of the tucked-up net protruding beyond the point where tied.

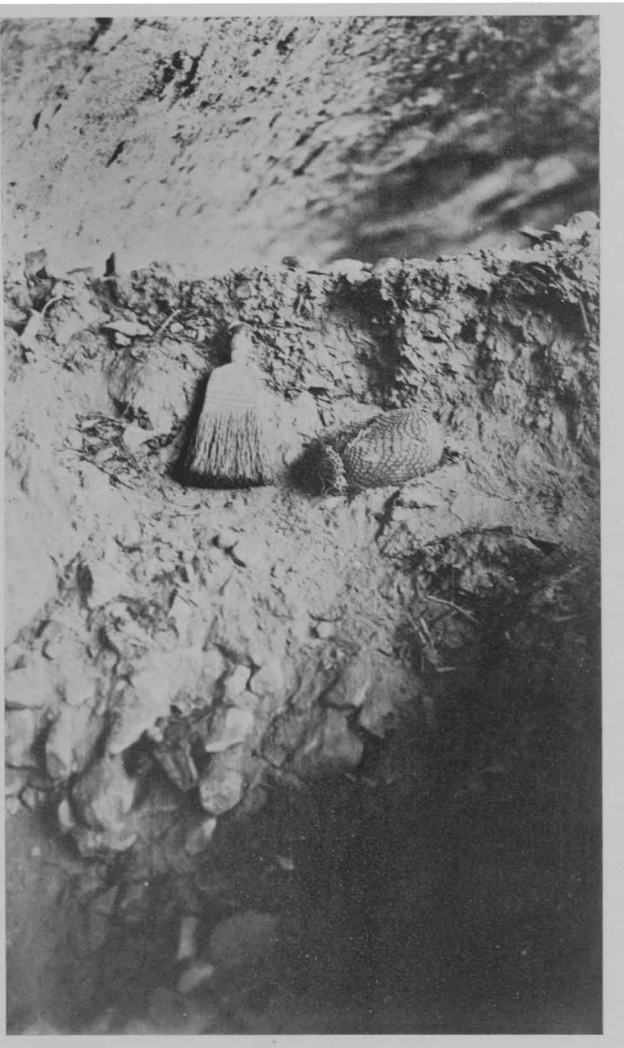

Figure 16. A mano encased in twisted-fiber cord net, or bag, found at a depth of 6 inches, 2 feet from the wall.

It would seem that the net was either made for the purpose of encasing the mano, or else a piece of the necessary size was cut from a larger net. The placing of the stone in the net may have been either for utilitarian or for ceremonial purposes.

This net is made of a strong, even cord of two strands, twined from fibers of *Agave lechuguilla*, and the weaving of the loop type is exceptionally well done. The net as a whole indicates a highly developed art in net weaving (Plate XVI).

When found, the net-covered mano was imbedded in a deposit of burnt rocks, ashy soil, and trash.

Concentrated Midden Deposits

From 320 to 370 the shelter floor is some three feet lower than the floor both to the north and to the south of that section. That particular section has a fairly upright wall. The portions of the shelter that have deeper deposits are invariably those where the roof is only a few feet above the floor level, *i.e.*, very low. It appears that the parts of the shelter where the ceiling was low, not being so good for living quarters, were favorite spots for fires and for dumping camp refuse. In that manner the deposits at such places were built up more rapidly.

At 275–0 the depth to undisturbed shale was 95 inches.

Burial L–6 (Group)

Location: 260 to 263–2 to 8.

Depth to the top skeleton, 36 inches; to middle skeleton, 43 inches; to bottom skeleton, 49 inches; to grave floor of bottom skeleton, 57 to 62 inches.

Bearing: Skeleton No. 1, head 15° east of south; skeleton No. 2, 10° east of south; skeleton No. 3, due east; skeleton No. 4, 20° south of west. Of interest is the fact that of the four complete skeletons in this one grave, two were placed with the heads to the south, one to the east, one to the west, and none to the north.

Skeleton No. 1, farthest to the west and nearest the wall of the shelter, was on the left side, with knees flexed against the chest, facing west of south. The skull was relatively small with little, if any, signs of artificial deformation. Only one lower and five upper teeth remained in place. The teeth were badly worn. The skeletal material was in good condition. The length of femur was 13¼ inches. Two large stones were piled just west of the skeleton, but were not resting on it. Three well shaped manos were arranged in

triangular form 6 inches south of the skull. A few projectile points were about the skeleton at various places and in the earth and ashes for 2 feet above. A rough mano was to the northwest of the large stone.

Skeleton No. 2 occupied a central position among the other skeletons. The skull was slightly larger than that of No. 1. The back of the skull was to the south, the face to the north. It was in a crumpled position, as if crammed into a small space. The length of the femur was 16 inches. The skull and teeth were in bad condition, and, on the whole, the skeletal material was in worse condition than that of No. 1. A large metate, placed over No. 3, covered a portion of the body of No. 2. The legs were doubled up and the knees were some ten inches higher than the skull. This was an adult male.

Skeleton No. 3, with the skull at the extreme east end of the grave, was deeper than Nos. 1 and 2. It was on its back, flexed (an unusual position for a flexed burial), with the knees resting against the left side of the skull. A rib was over the left eye. A large metate rested on the chest of No. 3 and on the nose and right cheek. There was a cracked place in the back of the skull, as if caused by a blow. The back of the skull was down, with the eyes straight up. Another large metate lay just to the south of the legs. A large, finely made projectile point and a long narrow knife-like point were 3 inches to the east of the skull.

Skeleton No. 4, beneath the large stones that lay west of skeleton No. 1, was discovered in removing the first three skeletons. The leg bones of No. 4 rested on the torso of No. 1. Skeleton No. 4 was placed with the hips some eight inches higher than the shoulders. It was on its back, with neck bent, and the skull resting on the right side, facing southeast. The depth at the shoulders was 62 inches. The skull was in fair condition, but the lower jaw was broken and most of the teeth were gone. The upper teeth were badly worn. Most of the bones were in a fair condition. From the top of the skull to the lower part of the pelvis measured 33 inches. A mano was located 20 inches south of the skull, and a small metate was 8 inches west of the mano.

There was a mano 30 inches to the south of skull No. 1. At 29 and 36 inches south of west of skull No. 1 were two well shaped

manos with the typical sharp edge on one side. To the west of them (8 inches higher up) rested a medium sized metate. The metate bears red paint over the edges and the used side. Eight inches west of the metate were three well-made and much-used manos.

Fragments of a thin skull were found at the outer edge of the painted metate. It was badly disintegrated and seemed to be the remains of a child. It was found, as the work of uncovering the burial progressed, that small finger and toe bones, as well as the fragments of a thin skull, were scattered throughout the grave and for as much as two feet in several directions. This indicates disturbance by animals. A rodent or coyote hole passed through the grave. It seems likely that the child burial, being 8 inches shallower and somewhat to one side of the adult skeletons, represents an intrusive burial. But, due to the disturbed condition, this cannot be stated as a definite conclusion.

In the soil for 2 feet above and on all sides of the skeletons were flint artifacts. Although there is some question as to whether they were all actually deposited in the grave, they were so regarded in making the table below. The following listed artifacts accompanied the burial:

Flint projectile points: Whole	54	
Broken	34	88
Flint scrapers		28
Manos		13
Used pebbles (bearing marks of wear from grinding)		16
Flint knives, small		8
Polished pebbles		7
Carved pebble		1
Metates		4
Flint fist axes		2
Bone bead		1
Fragment of grooved wood		1
Fossil		1
Total		170

A number of the polished pebbles found in the grave are of the same type as certain painted pebbles from other parts of this shelter. It seems possible, therefore, even probable, that some of the polished grave pebbles may have been painted at the time of their being placed in the grave. A number of the painted pebbles have designs so dim that they can scarcely be traced.

No evidence of basketry or matting was found in the grave.

The burial was in a loose, ashy deposit. There were hundreds of snail shells in the deposit, also many flint chips and some small animal and bird bones. Considerable charcoal was present. This was probably only a natural result of the burial having been made in a midden deposit.

Of the nine types of projectile points found in the shelter, this burial contained specimens of seven. In connection with type No. 2 (Plate XII a), it is interesting to note what Kidder and Guernsey say about a tanged point of the same type: "This is surely a head for a dart foreshaft."[12] The projectile point they were discussing is 1⅞ inches long. Points of that type found in the rock shelter in Seminole Canyon range from 1½ to 2¼ inches in length.

Burial L–7

Location: 251 to 253–0 to 1½; depth, 60 inches.

This was the burial of a child of perhaps eight or ten years of age. The skeleton was in a bad state of decay. Two-thirds of the skull remained, also parts of the long bones and pelvis. It was on the left side, facing northeast. It lay against the wall of the shelter with the head to the southwest and the feet to the northeast. It was flexed with the knees against the wall.

Artifacts accompanying the burial were as follows: flint knife, 3 9/16 inches long, east of the ankles; used or rubbed pebble (not painted), 12 inches east of the skull; egg-shaped or gourd-like object 1¾ inches long and 1 inch in diameter, east of pelvis.

Dr. C. W. Gilmore, Curator of Vertebrate Paleontology, National Museum, reported on the egg-like object as follows: "Do not believe the specimen sent is organic in origin. It is not a fossil egg. Would suggest that it be referred to Dr. Foshag."

Dr. W. F. Foshag, Curator of Mineralogy and Petrology, National Museum, reported: "A concretion of calcium carbonate, made up of layers, successively deposited by water. Such concretions are sometimes fairly common in marls deposited in fresh water."[13]

There was no evidence of basketry or matting in the grave.

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[12]Nusbaum, *op. cit.*, p. 149.

[13]U. S. National Museum, Report No. 123,340, to the Department of Anthropology of The University of Texas, March 21, 1933.

Burial L–8

Location: 248 to 251–7 to 12.

Depth: 54 inches to grave floor; 39 inches to top of a metate at the foot of the grave.

Bearing: Head 30° west of south.

The skeleton was flexed, on the right side, with the knees 12 inches from the chin. The skull was facing east and in a bad condition. Seven badly worn lower teeth remained in place. The long bones were in a good state of preservation.

Two large metates were on the skeleton. One, 16 by 15 by 5 inches, had a deep depression in the center and four shallow pits, or depressions, around the central one. It rested, pits up, on the left side, shoulder to hip (leaning to the north side of the skeleton). A still larger metate, broken in half, one end missing, was immediately to the east of the other, covering the legs from toes to knees.

At a depth of 49 inches, and about 12 inches southwest of the skull, was a conch shell gorget or plaque. It is 5½ inches long, 3 inches wide, and ⅛ inch thick (Plate VIII b). It lay immediately beside a small metate. The gorget bears no carved decoration, but has five drilled holes. The central perforations may have been used for suspending feathers, pendants, or other fetishes. No pendants were found in the grave.

Beside the shell gorget was a broken spearhead; to the east of the metate, near the feet, was a flint knife 3½ inches long; two projectile points lay just to the south of the skull; a small metate, with red paint rubbed into one side, was just to the east and 8 inches lower than the broken metate.

No evidence of matting or basketry was found in the grave, but it is possible that such objects may have accompanied the body originally and have disintegrated so completely that no trace remained.

Preliminary Study of Skeletal Materials

The following is taken from the previously cited thesis of Mr. Sidney J. Thomas, who made a preliminary study of the skeletal material from this site:

Cephalic and nasal indices of Val Verde County skulls, including those from the Fate Bell burials, are shown in the following table:

Specimen	Cephalic Index	Nasal Index
892	73.5	49.0
893	74.9	50.0
894	70.6	50.0
895	68.8	51.8
A	70.4	?
B	73.1	?
C	67.9	49.9
L-1	62.2	55.3
L-2	?	55.3
L-3	70.0 (Approx.)	?
L-4	72.9	51.1
S&M	72.3	53.1

Figures for specimens numbers 892 to 895 were taken from an article by Bruno Oetteking.[14] These measurements were taken on skulls excavated from Satan's Canyon in Val Verde County, Texas, by Mr. Coffin in 1929. The nasal indices on C, L-1, L-2, L-4 and S&M may not be accurate due to slight fractures on sidewalls of nasal openings, and were included in this paper only for comparison and because specimens are so few.

Specimens A and B consist of calvarium only. Specimen C is in good state of preservation. These three skulls are in The University of Texas Anthropological Museum and are from skeletons taken from a cave on the Orr ranch on Devil's River in Val Verde County, Texas.

Specimens L-1, L-2, L-3, and L-4 were excavated from the trench in Fate Bell Shelter on Seminole Canyon. Specimens L-1 and L-4 are in fair states of preservation and are complete. Number L-2 was badly crushed, but the nasal cavity and lower jaw were undamaged. Measurements on skull number L-3 are approximated, as only the calvarium is available.

Specimen S&M is complete, is in fine condition, and was unearthed in site number 2 on Seminole Canyon.

There are no signs of head deformation. Long headedness, with a tendency towards hyperdolichocranium, and poor teeth seem to be the outstanding characteristics. The rear molars of the lower jaw usually are missing.

Specimens A, B, C, L-1, L-2, L-3, L-4, and S&M, other fragmentary skeletal remains, and an infant skeleton complete are stored in The University of Texas Museum for future and more detailed study.

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[14]Bruno Oetteking, "Skeletal Remains from Texas," *Indian Notes*, VII, No. 3, Museum of the American Indian, Heye Foundation, p. 340.

Isolated Finds Near Wall

A small pitted stone (Fig. 33), found near a sotol-stalk hearth stick, suggests the possible use of the stone as a cap for a fire-drill; depth 4 inches, 215–1.

At a depth of 30 inches, 210–1, was an unusually well made, long, narrow arrowpoint (Plate XII b).

At 190 to 192–0 to 3, depth 32 inches, were artifacts as follows:

Large metate, 20 by 16 by 3 inches; multiple pitted.
Small metate, 13 by 12 by 4 inches; depression on each side.
Carved mano stone; no definite design; "numerical" notches on edge.
Smooth stone bearing daubs of red paint.

These specimens were grouped as might have been the case in a burial, but there was no positive evidence of a grave.

From a depth of 48 inches at 160–0, the floor level rose to 39 inches at 170–0; and dropped at 185–0 to 60 inches. The strip, 160 to 185–0 to 2, next to the wall, was almost sterile, but 2 feet outward and beyond many projectile points were found.

Projectile Points

Of considerable interest is the presence in this site of a very large number of projectile points. This seems to be significant in view of the fact that comparatively few projectile points have been reported from excavations in Brewster County of the Big Bend region. In an attempt to determine the facts that might bear upon the problem of stratification, the projectile points were kept separately for the three following levels: upper level, 1 to 36 inches; middle level, 36 to 60 inches; lower level, 60 inches to the bottom of the occupation area.

In a strip 20 by 10 by 3 feet, 140 to 160–0 to 10, depth 1 to 36 inches, were found flint artifacts as follows:

Condition	*Number*	*Per cent*
Whole	197	43
Broken	263	57
Total	460	100

From the same part of the trench from depths of 36 to 48 inches, the latter depth being at bedrock, came artifacts as follows:

Condition	*Number*	*Per cent*
Whole	84	57
Broken	63	43
Total	147	100

The totals from the two levels were as follows:

Condition	*Number*	*Per cent*
Whole	281	46
Broken	326	54
Grand Total	607	100

The same percentage as prevailed for the above mentioned section of the main trench held good for the trench from the wall out for some forty feet, but the outer half of the main trench contained very few projectile points.

Approximately 95 per cent of all flint artifacts found were secured by screening the ashy deposit. A heavy screen with ¼ inch mesh was used for that purpose.

Some of the projectile points were highly patinated, while others from the same depths had little or no patina. One of the points was made of silicified wood, a few of a poor grade of chert, but most of them were made from a fairly good grade of flint. The materials could be obtained in the immediate vicinity. The region is that of the Edwards Plateau of the upper Cretaceous and is famous for its fine flint.

Projectile points and other flint artifacts were found at all levels, but approximately 80 per cent came from the middle level, 15 per cent from the lower level, and 5 per cent from the upper level. These percentages are based on returns from all digging done in Site No. 1, Seminole Canyon.

Types of Projectile Points

The projectile points have been divided into nine types, or general classes, based on the shapes of the tangs and certain other characteristic features (Plate XII a). In an exhaustive study, two or more sub-types might be set up under several of the general types.

There is a wide range in sizes and workmanship. But it cannot be said that any one type, size, or grade of workmanship is confined to any given level. There are some very small, delicately chipped

specimens (Plate XII b), many of medium size and fairly well made, and again a considerable number that are large and very crudely made. Some of each classification were found at all levels. This fact was surprising and is not in keeping with conditions in the deep burnt rock middens of Central Texas. In the latter region the fine small points, which are surely for the arrow, are always and only in the top level of deep old middens, while the middle and bottom levels contain different types of dart heads.

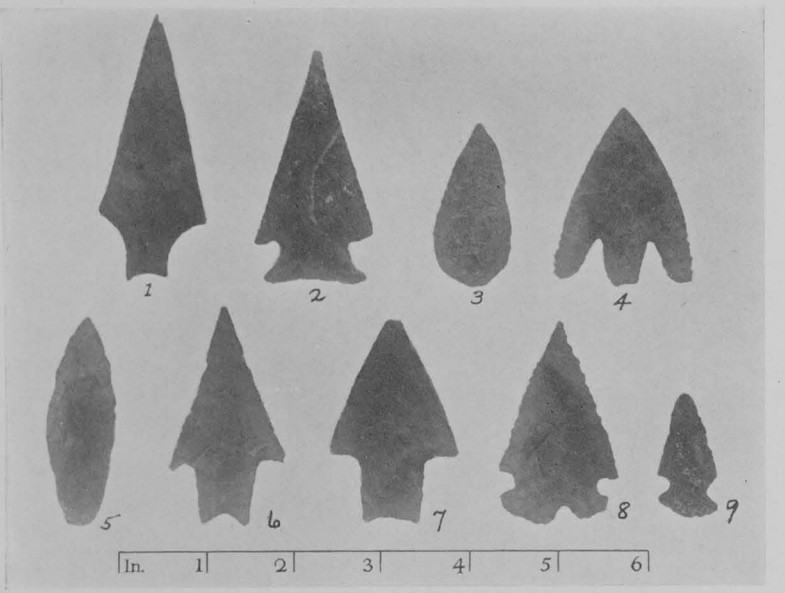
Thomas, who made a study of the projectile points from this shelter, makes the following statements regarding sizes and numbers of points of the various types:

> The average measure for all of the projectile points will run one and one-eighth inches in width and one and three-fourths inches in length, indicating that, as a whole, the projectile points were too large to have been used in arrowshafts.

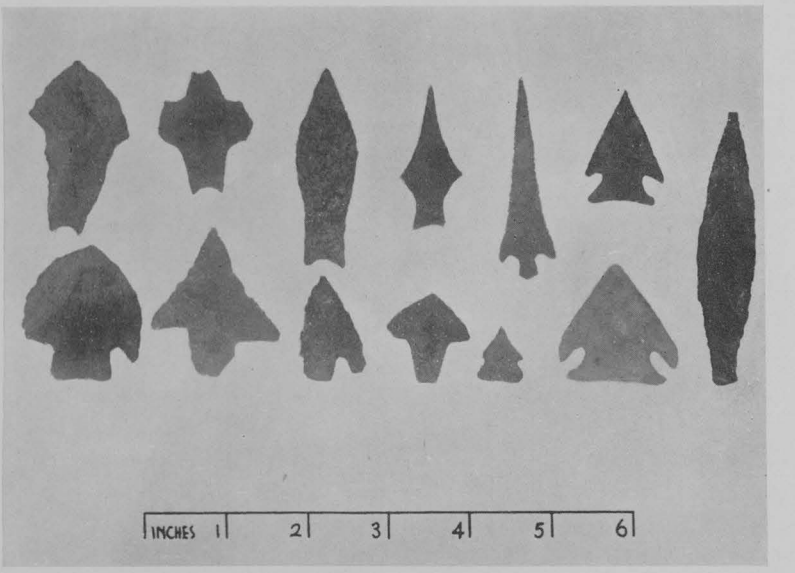
FLINT PROJECTILES

Type	Number Obtained	Percentage
1	415	28
2	77	5
3	26	2
4	191	13
5	117	8
6	32	2
7	251	17
8	153	10
9	202	13
Eccentric	31	2
Total	1,495	100
Very small	38	2.5
Very large	72	4.8

> Thirty-one more or less eccentric points of extreme cuts and of fine workmanship were found; but upon close scrutiny we find that they may be classed under one of the nine types. There are also blending forms that are intermediate in type, and are difficult to classify.
>
> Thirty-eight of these artifacts must be classed as arrowpoints, as they are too small to be classified otherwise, their size varying from one-half to eleven-sixteenths of an inch in width and from three-quarters to one and one-eighth of an inch in length. . . .
>
> Seventy-two large projectiles were found. Their sizes varied from one and a fourth to two inches in width, and from two and a half to three and a half inches in length.



(a) Nine types of projectile points, found at all levels in the shelter. No. 1 is 3 inches long.



(b) Projectile points; some eccentric, some blunted by resharpening. Certain of these greatly resemble specimens from the upper and bottom levels in burnt rock mounds of Central Texas.

In each of the three levels type No. 1 (Plate XII a) was more numerous than any other type. Twenty-eight per cent of all the projectile points are represented by this type. The type has five distinctive features:

(1) The two sides of the tang are chipped from opposite directions and on one side only, leaving the reverse edge of each with an "unfinished" appearance. The balance of the point is chipped as usual. This form of tang belongs to the lowest level in the Central Texas burnt rock mounds.

(2) The end of the tang is rarely square across, but almost always has one corner lower than the other. The tang as a rule widens as it approaches the blade proper, a character not usual in this type in Central Texas.

(3) The specimens are thinner than the average projectile points of the region. They are, on the average, slightly over one-eighth of an inch in thickness.

(4) All angles are sharp, especially the penetrating point, except when it has been broken and resharpened.

(5) On some of the specimens in this type a fifth feature is present. It is a twisted or spiral effect, given by chipping from one side only. The twist is more pronounced on some specimens than on others.

Type No. 5, consisting of 8 per cent of the projectile points, is long and slender, spiraling downwards from the point to the base end. The tang is usually entirely absent, or merely an extension of the blade. The base end is almost square with a slight flattening for insertion in the shaft. This type of point is not confined to this region but is present in varying numbers, more often in the bottom levels of midden deposits, in the central and southern parts of the State.

Type No. 6, represented by only 2 per cent of the projectile points, has a distinctive notched tang so different from that in type No. 8 as to justify a separate classification. While found in certain other places, this type is more common in the middle level of the burnt rock mounds in Central Texas.

Type No. 8, comprising 10 per cent of the projectile points, is characterized by a crudely notched tang. These specimens, usually well made in Central Texas, are thick and not well made at this

place. The edges sometimes are slightly serrated. This type is strikingly like typical forms from the middle level of the Central Texas burnt rock mounds.[15]

The other five types are pretty generally distributed over the State and are not identified with any given stratum or region.

Other Flint Artifacts

Other flint artifacts included 313 scrapers, 169 knives, 2 knives with corner-tang, 1 awl with corner-tang, 21 awls or drills, 10 bone crushers, 13 war club spikes, 8 fist axes (*coups-de-poing*), 3 gouges, and 1 each of hoe blade, ax, and spokeshave. Some of the most outstanding of these, notably the corner-tang implements, have been described in discussing the excavation.

The scrapers are of various sizes and shapes. They are not unusual, excepting a large thin type bearing fine secondary chipping around the edges (Fig. 17). Most of these specimens are side-scrapers, there being present comparatively few end-scrapers. The average size is about 2½ by 2 by ¼ inches. Very few of the "duck bill" type of scraper, so common in Central Texas, are found in the Seminole Canyon region.

Most of the knives show evidence of a mastery of the art of flint chipping (Fig. 18). About eighty of them still retain sharp cutting edges. The knives vary in length from 1¾ to 5¼ inches, with an average of about 3½ inches. The average thickness is ¼ of an inch, although one specimen was less than ⅛ of an inch. They bear a close resemblance to many of the best made flint knives of Central Texas, though the chipping is not, on the average, so good as in the latter region. No knife was found hafted.

The fist axes, intended for hand chopping without hafting, are identical with those found farther down the Rio Grande and in South Central Texas. The lower ends of some of them are worked to sharp edges, while the upper ends are unworked. They usually have enough weight to be effective for chopping.

The bone-crushers have crudely worked, thick blades, showing much battering from heavy use on what was once an edge. These

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[15]J. E. Pearce, *The Present Status of Texas Archaeology*, pl. 10.

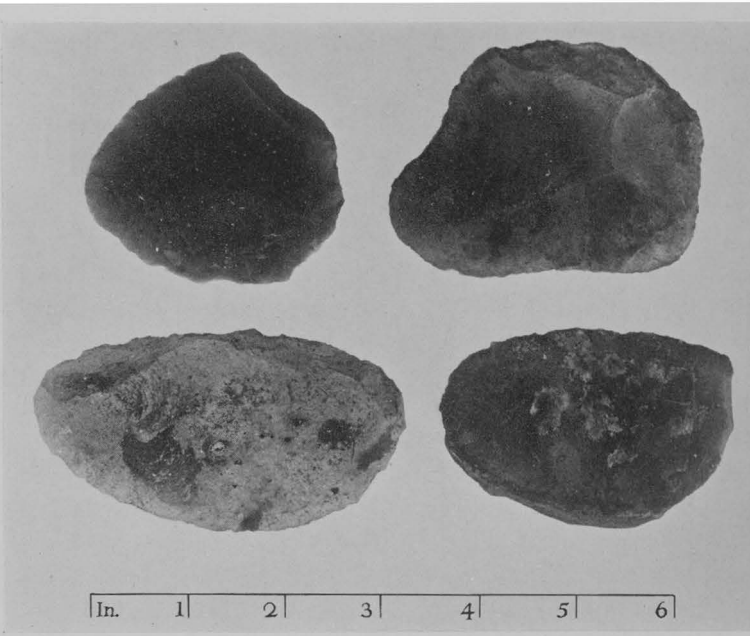


Figure 17. Flint scrapers of the side scraper type common in this shelter. The edges are well worked by secondary chipping. The length of the specimen at lower left is 3¾ inches.

specimens are identical with those found in the burnt rock middens of Central Texas. They were probably used for splitting bones to get at the marrow. Some implement used for such a purpose was much used all over Texas, and the condition of these implements harmozines with the supposition that they were the tool in question.

The so-called war club spikes appear to be too crude and heavy to have been used as projectile points. They may have been hafted and used in war or the chase as a bludgeon. They likewise are found in the midden deposits of Central Texas.

The drills, or awls, often exhibit excellent workmanship. They vary in length from 1¼ to 4 inches. Four of them were made by reworking projectile points. The practice is common in the Central Texas region.

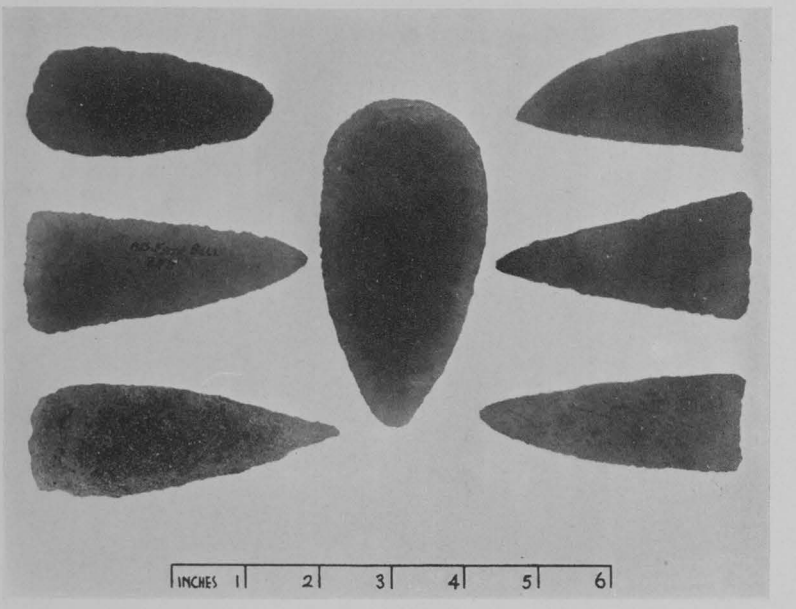


Figure 18. Flint knife blades, all of types common in this shelter and found widely over Texas.

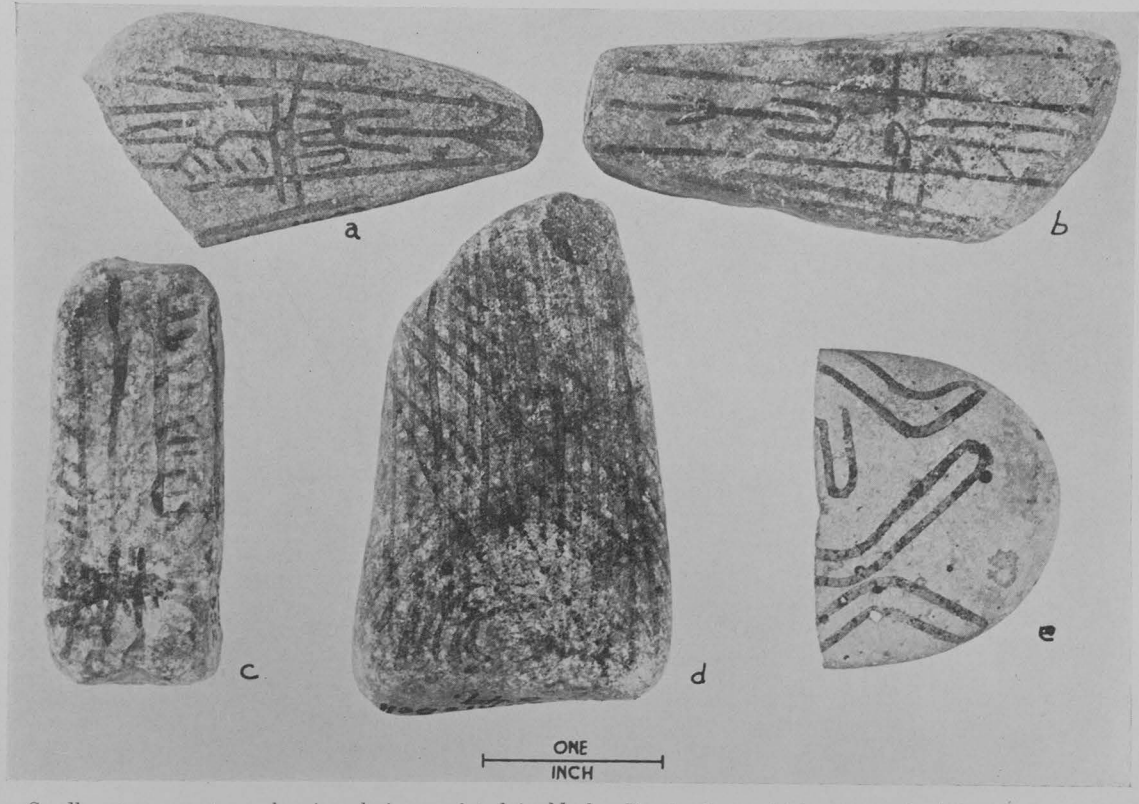
Painted Pebbles

Forty-eight painted pebbles were found in the shelter. Eight were broken. For several days after the excavation commenced no painted pebbles were found except in the upper 18 inches. It then appeared as if the last occupants of the shelter were the only ones who practiced the art of painting designs on small flat waterworn pebbles. But as the work progressed, a painted pebble was unearthed at a depth of 99 inches; later, other specimens of this type came from the various levels. Hence it became evident that the practice was common to all who inhabited the shelter, even from the most remote time.

Of the pebbles excavated 67 per cent came from the upper 25 inches, 21 per cent from depths of 25 to 40 inches, and 12 per cent from below 40 inches.

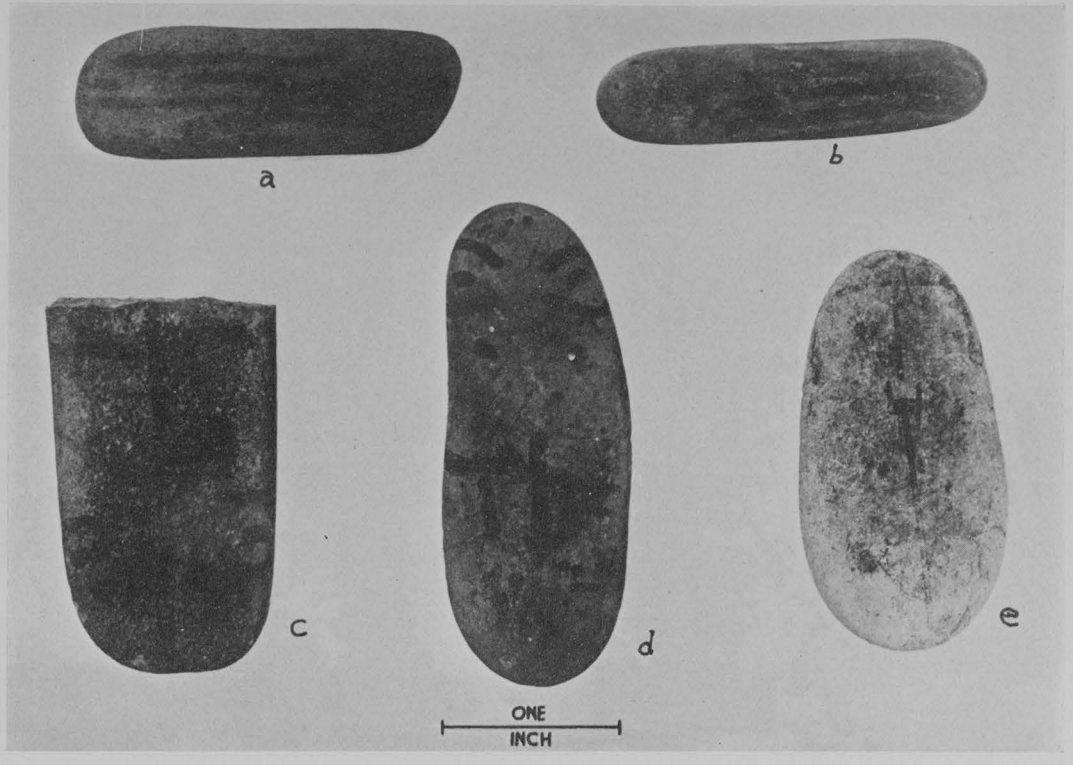
The painted designs on a few of the pebbles remain clear and bright, but on a majority they are somewhat dim. Frequently they are so nearly obliterated that but little remains of the original designs. On twenty of the pebbles the paint is barely discernible.

PLATE XIII



Small waterworn stones bearing designs painted in black. Depths from which excavated: (a) 12 inches; (b) 30 inches; (c) 30 inches; (d) 99 inches; (e) 9 inches. Some of them are painted on both sides.

PLATE XIV



Painted pebbles bearing various designs. Note the representation of eyes and mouth on specimens (c) and (d). Depths at which found: (a) 30 inches; (b) 18 inches; (c) 10 inches; (d) and (e) surface finds.

PLATE XV

Painted pebbles bearing unusual designs. Depths: (a) 30 inches; (b) 21 inches. Specimen (b) is decorated with a blanket-like design resembling a rock picture at Hueco Tanks near El Paso, Texas.

This fact causes one to suspect that some of the smooth, obviously shaped, pebbles found here and there throughout, and which now show no evidence of paint, originally may have borne designs.

Black was the predominant color of paint used. One design has a trace of red bordering the black; another bears a very dim design in red paint.

In length the pebbles vary from 1½ to 4½ inches, in width from ½ to 2¼ inches, and in thickness from ⅛ to ½ inch. A number of the painted pebbles are shaped more or less like the human foot. This resemblance probably is a mere coincidence.

It seems worth noting that a number of the painted pebbles from Site No. 1, Seminole Canyon, and from other nearby rock shelters, bear evidence of having been scratched and pecked in spots. Three of the pebbles show signs of scratching and pecking on the side opposite the painted design. Six are scratched on the painted side, two on both sides, and one on the end. There are likewise ten of the smooth, but now unpainted, pebbles that have small areas scratched and pecked. The scratching and pecking apparently were not incident to shaping the stone, since in most cases the scratches are upon a smooth surface. They give the impression of having been made by striking the pebble in hammer-like fashion against a flint edge.

Martin and Woolford state that among certain painted pebbles found in September, 1931, by a Witte Museum expedition, in a rock shelter on the Rio Grande near Shumla, Val Verde County, was one that bore painted tracks of a hoofed animal, resembling those of a horse.[16] On pebbles found in Site No. 1, Seminole Canyon, there were no designs that bore even a remote resemblance to horse tracks.

Coffin reproduces a photograph of a painted pebble from Brewster County showing a design almost identical with one on a pebble in the E. F. McNutt Collection, found in a rock shelter east of the Pecos River in Val Verde County.[17]

Setzler also reports the finding of painted pebbles in Brewster County, Texas, but not in considerable numbers.[18]

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[16]S. Woolford and George C. Martin, *Painted Pebbles of the Texas Big Bend*, p. 23.

[17]Coffin, *op. cit.*, Pl. IX.

[18]F. M. Setzler, "Prehistoric Cave Dwellers of Texas," *Explorations and Fieldwork of the Smithsonian Institution in 1932*, p. 56.

Some writers suggest that the painted pebbles may have been broken intentionally. This seems highly improbable. Of the forty-eight specimens found by us in Site No. 1, Seminole Canyon, only eight were broken. Breakage probably was accidental, rather than intentional.

A few so-called palettes, some of mussel shells and others of small flat stones, were found in the shelter and may have been used as paint containers while pebbles or wall pictographs were being painted.

On the thirty-four pebbles on which paint is discernible, twenty have the designs on one side only, eleven are painted on both sides, two on both sides and on the edges, one on one side and edge.

The painters of these designs exhibited considerable skill. While most of the pebbles have smooth surfaces that lend themselves readily to the painting of designs, there are a few specimens of rough crude stones with uneven surfaces. Even in those cases the designs are well executed.

In attempting to classify the different forms of decoration appearing on the pebbles, it is at once evident that most of the designs are composed of various elements. Sometimes as many as five elements are combined in the decoration of one specimen.

The design elements present and the number of times each was employed in the decoration of these pebbles are as follows:[19]

Horizontal lines	24
Geometric figures	15
Ladder symbols	12
Scrolls	10
Vertical lines	10
Sun symbols	8
Projectile shafts	7
Serpents	5
Cross	5
Dashes, or enumeration dots	5
Human faces	5
Moon symbols	4
Trees or plants	4
Lightning symbols	4
"Death counts"	3
Human figures	2
Crosshatch	2
Bird	1
Animal or insect	1
Blanket-like figure	1
Tepee-like figure	1

[19]This tabulated study of designs on the pebbles is the work of Mr. A. T. Jackson. His co-author is dubious about some of his identifications of elements but accepts most of them. J. E. P.

Included in the designs are five that bear a resemblance to pictographs in this shelter and elsewhere in the canyon, and one is suggestive of a petroglyph on the cave wall.

A blanket-like design appears on a large pebble unearthed at 150–42, depth 21 inches (Plate XV b). The black paint is somewhat dim, but the design is sufficiently legible to suggest immediately a resemblance to a blanket design in a rock picture at the Hueco Tanks, some twenty-five miles northeast of El Paso, Texas. It is crude, however, and amounts to nothing more than parallel zigzag lines.

A pebble from a depth of 6 inches, at 158–13, bears two zigzag "lightning" designs on one side and a third on the other. Another specimen, depth 12 inches, 158–69, bears a similar design. These designs are identical in arrangement with certain zigzag lines painted in red on the wall of a rock shelter near Lange's Mill, about twenty miles northwest of Fredericksburg, Gillespie County, Texas.[20]

A small, rough stone, from a depth of 30 inches at 276–0, bears three sets of "death counts," two on one side and another on an edge (Plate XIII c). Mallery explains such pictures as follows: "The black strokes indicate the death of persons of the number delineated and the union line shows that they were of the same tribe."[21]

Estill pictures a red pictograph from a rock shelter in Gillespie County, Texas, that is almost identical with the death-count design on the edge of the pebble from Site No. 1, Seminole Canyon. She describes the Gillespie County painting as "perhaps a hay rake used by American farmers."[22]

Of particular interest is a rough pebble, from a depth of 18 inches at 154–18, bearing moon and snake symbols on one side. The reverse side is not painted. The designs on this pebble resemble those of a pictograph on the wall of the same shelter.

A small, thin pebble, from a depth of 6 inches at 396–5½, bears on one side a number of hairline designs, now very dim. There are represented human figures; trees or branches; circles, some with a dot in the center; and other nondescript designs. These designs

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[20]Julia Estill, *Indian Pictographs near Lange's Mill, Gillespie County, Texas*, Pl. II.

[21]Garrick Mallery, *Picture Writing of the American Indians*, Tenth Annual Report of the Bureau of American Ethnology, p. 604.

[22]Estill, *op. cit.*, Pl. VII, fig. 24.

bear a resemblance to petroglyphs at Oakley Spring, Arizona, pictured by Mallery, who calls them "notices of visit, departure and direction."[23]

A large pebble, from a depth of 36 inches at 428–2, bears on one side three sets of interlocking scrolls. These are suggestive of certain incised designs common on earthenware vessels accompanying burials in East Texas.

On a broken pebble that came from a depth of 10 inches, at 157–22, is a design painted in black with a trace of a red border. It is realistically designed and suggests an attempt to portray the human face. The eyes are represented by circles with a dot in the center of each (Plate XIV c). Another very similar design (Plate XIV d) has the eyes represented by curved lines which do not quite meet around the central dot, or pupil. Certain features make this design look like an insect rather than a human face.

One of the most unusual, and at the same time problematical, designs is that on a large pebble discovered at a depth of 30 inches, 158–10 (Plate XV a). Among other elements are what seem to be human characteristics, including eyes, eyebrows, and suggestions of tears. There are also two branches, bearing large leaves, crossed near the base, and the likeness of snakes. The design elements are executed in bold, wide strokes.

The only bird pictured is on a small, rough pebble found at a depth of 30 inches, 276–0. The bird has a long beak, large head and body, sharp tail, and long, slender legs. A dot represents an eye. It is perched on a limb but appears to be in readiness for flight.

On a small pebble from a depth of 22 inches, at 149–20, is pictured an animal or insect. It has hind legs, wing-like protrusions and a long neck.

The deepest of the painted pebbles was found at a depth of 99 inches, at 141–64. The stone is ½ inch thick and bears a well-executed crosshatch design (Plate XIII d), such as is frequently found incised on certain earthenware vessels in East Texas.

A design that has been classed, for lack of a more fitting name, as a projectile shaft appears on eight of the pebbles. On five specimens it consists of a shaft bearing symbolical feathers at the nock end and the representation of a large projectile point at the distal

[23]Mallery, *op. cit.*, p. 329.

end (Plate XIII a). In one case the "feathers" are placed near the center of the shaft (Plate XIII b). On the two remaining pebbles feathers occur both at the nock end and at the center of the shaft. Three of the shafts do not show projectile points but seem to represent sharpened hardwood shafts such as those found in the shelter. The pebbles bearing these projectile-shaft designs came from depths ranging from 12 to 40 inches.

Outstanding among the so-called "ladder" symbols are the designs appearing on pebbles found at depths of 6, 28, and 38 inches. The design consists of two vertical lines connected at regular intervals by three horizontal lines, or rungs. These are strikingly like the incised ladder, or hatched, designs which decorate certain earthenware vessels found in East Texas.

Another type of ladder design is that represented by one vertical line with from three to seven cross-arms, or rungs, equally spaced.

It seems possible that these ladder-like designs on painted pebbles may have been suggested to the mind of the aboriginal artist by the pole ladders used for scaling steep cliffs and as an aid in painting pictures high on the wall and roof of rock shelters.

This study of the designs on painted pebbles is not intended to be exhaustive. Many more specimens must be secured, studied, and compared before any definite conclusions can be arrived at as to their significance. Their number, character, and distribution indicate that they were an important element in the life of the early men who lived in this shelter. They are suggestive of the churingas of Australia and were almost surely sacred objects.

Metates and Manos

Many metates and manos were found in the shelter. The metates brought away numbered 43, and the manos of various kinds totaled 156. Since no evidence of corn was discovered in the shelter, it would seem that the numerous stones were used for purposes other than corn grinding. The metates, as well as the deep mortar holes, were probably used in grinding mesquite beans, acorns, and cooked sotol crowns. Buckelew's statement suggests the latter use.[24]

Twenty-nine of the metates do not show extensive use. One stone, 11 by 9 by 2½ inches, on the surface partly imbedded in dirt and

[24]Wilson, *op. cit.*, pp. 59–62.

ashes, at 389–1, gives some evidence of having been used as a metate. But the interesting feature of the specimen is the presence of painted designs. Concentric circles in black appear around the slightly used basin, while small black lines radiate from the circles to the outer edges of the stone. It seems to be a crude sun symbol.

Eight metates appear to have been used in grinding pigments. The basins of four of them are tinted with red, one has orange, and three show a mixture of black and red. The metate accompanying burial L–8 was painted red over the used side and the edges.

One well shaped metate of red sandstone and the three manos of the same material on which it rested have been described in connection with the report on the work of excavation (page 59 and Fig. 7).

Most of the metates are of the large thick type. The outstanding ones are five multi-pitted specimens, previously mentioned (Fig. 6). They consist of a deep pit at or near the center, with shallow depressions forming a circle around the central pit. This type of metate is not found in the burnt rock mounds of Central Texas. The metates of this last region have a long basin indicating grinding by a sliding movement of the mano. The basins of metates at Site 1, Seminole Canyon, are largely of circular form indicating a pounding rather than a sliding operation.

The manos, or rubbing stones, are of various types. Some are of volcanic material, roughly pecked into shape. This material must have come down the Rio Grande from northern New Mexico. Four are double convex; six have flat or plane surfaces and are rectangular in form. There are some square manos as well as many of the kidney-shaped type common to Central Texas. But the distinctive type, including sixteen specimens, is that of a mano worn in non-parallel planes on both surfaces and thus forming a pronounced edge on one side, suggestive of an ax though the edge is not sharp enough for them to have been used as such. On the opposite side the edge is an inch or more in thickness. This unique type has not been found by any University of Texas expedition among the corn-grinding manos in Central and East Texas. Coffin reports manos of this type from Brewster County, Texas.[25]

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[25]Coffin, *op. cit.*, p. 23.

Five of the manos carry traces of red paint. One of those stained with red paint also has a coat of black paint over a portion of the red surface.

The large symmetrical mano encased in a fiber-cord net has been described in dealing with the work of excavation (page 63, Fig. 16, and Plate XVI).

Cordage and Knots

The materials of upper level, from which the cordage, netting and most of the matting, basketry, and sandals came, consisted of a tangled mass of vegetable materials that could not be shoveled. It was removed by hand and trowel with a considerable amount of pulling and scraping. Each small bundle of detached material was carefully examined.

Most of the cordage found in the shelter was twined from the fiber of *Agave lechuguilla,* but an occasional piece was made of a finer fiber, appearing to be *Apocynum* sp.

The cordage seems to have been made by hand. No spindles or spindle whorls were found. The fragments vary greatly in size, ranging from 1/32 to 3/8 of an inch in diameter (Fig. 19). All of the fiber cords were twisted clockwise, as were all of the yucca-leaf cords except four, which were twisted counter-clockwise.

In this connection, it is interesting to note what Kidder and Guernsey say about cordage found by J. L. Nusbaum in Cave Du Pont, Kane County, Utah. "In twist almost every piece is anti-clockwise, though the component plies of multiple stranded strings are sometimes spun clockwise."[26]

Ten fragments of fiber cords were wrapped with skin, and on two some fur remained (Fig. 20). Dr. M. R. Gilmore makes the following statement regarding the skin-wrapped cordage: "A bundle of lechuguilla fibers slightly twined, and spirally twined, with very narrow strip of thin skin (rabbit skin?) in the manner of a furry cord; perhaps for weaving into a fur fabric. Only slight vestiges of the fur remain at present."[27]

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[26]Nusbaum, *op. cit.*, p. 104.

[27]Gilmore, *op. cit.*

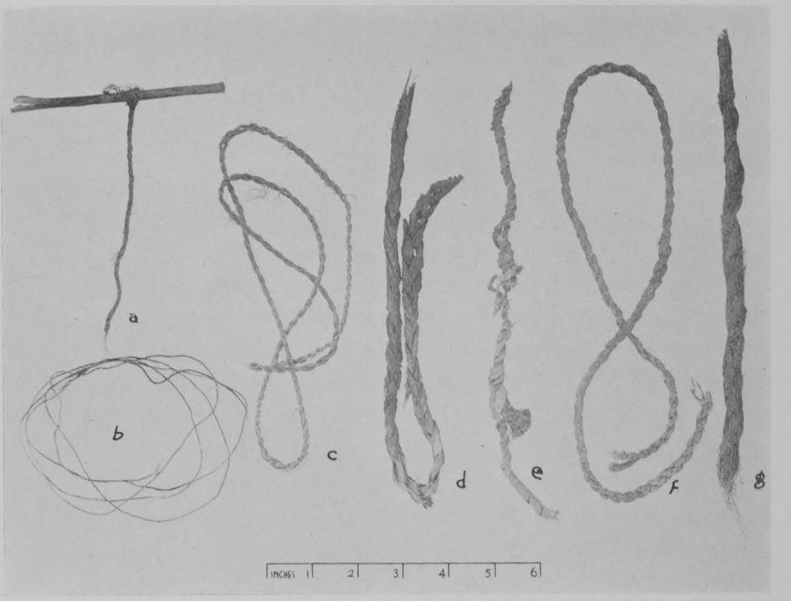

Figure 19. Fragments of cordage from the debris of the upper level. Specimen (e) is a fiber cord wrapped with yucca leaf; (d) is made of plaited yucca leaves; all others are twined from fibers of *Agave lechugillla*. In (a) note that the cord is tied to a small stick.

Only 6 pieces of cordage were made of four strands, while 133 were made of two strands. The cords of four strands were made by first twisting together two strands and then in turn twisting together the double strands.

The various uses to which the cordage was put are illustrated by certain finds in the shelter: net making, basket repairing, binding, sewing of leather, and sewing of cactus leaves.

These skin-wrapped cords probably were used for blanket weaving[28] or as tassel adornments of clothing.

An examination of fifty-seven knots tied in fiber cords from this shelter, not including those in network, shows the following types of knots:

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[28]A. V. Kidder and S. J. Guernsey, *Archaeological Exploration in Northeastern Arizona,* Bull. 65, Bureau of American Ethnology, p. 100.

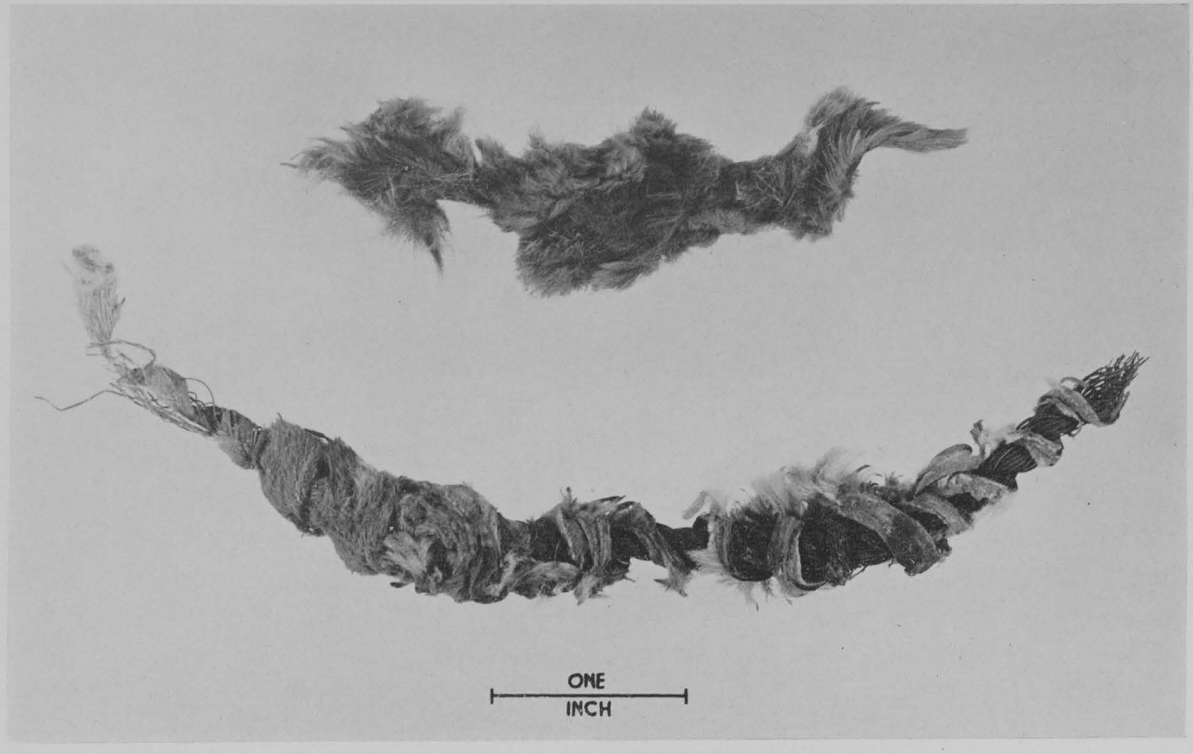


Figure 20. Skin-wrapped cords from the debris of the upper level. The cords are twined from fibers of *Agave lechuguilla* and have strips of thin skin, perhaps rabbit, twisted spirally around them.

Type of Knot	*Number of Specimens*
Square or reef-knot	29
Overhand	16
Sheet bend*	3
Combination overhand-loop†	3
Double square	2
Double overhand	1
Figure eight	1
Half hitch	1
Fisherman's	1
Total	57

*This type of knot was used in a piece of two-inch mesh netting.

†Used for splicing two cords together by tying an overhand knot in the end of one and slipping down against the knot the looped end of a two-strand twisted cord.

There were many sotol (*Dasylirion texanum* Scheele), lechuguilla (*Agave lechuguilla*), sacahuisti (*Nolina texana* Watson), and split Spanish dagger (*Yucca treculeana* Carr) leaves with knots tied in them. The numbers of the various types of knots, not including the ones in network, were as follows:

Type of Knot	*Number of Specimens*
Square or reef-knot	601
Overhand	228
Granny	41
Half bow	28
Larkshead	25
Sheet bend	11
Clove hitch	4
Stevedore's	1
Figure eight	1
Slip	1
Twists	65
Total	1006

In tying up bundles of yucca leaves, one leaf was wrapped around the bundle as a bond. Then, instead of tying a knot, the two ends of the leaf-thong were twisted around once or twice and turned under. In that manner the bonds held securely.

Netting

Of the nets recovered from this shelter eleven are made of fiber cords and three of grass. All but three are fragmentary, and several are in a poor state of preservation. The most unusual specimen of

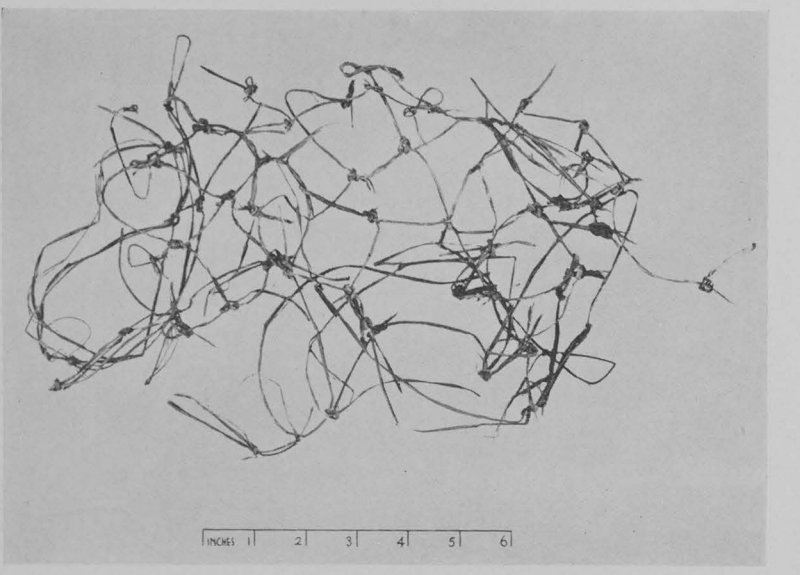


Figure 21. Fragment of a grass net, found in the debris of the upper level. The larkshead knot was used in the manufacture of this net.

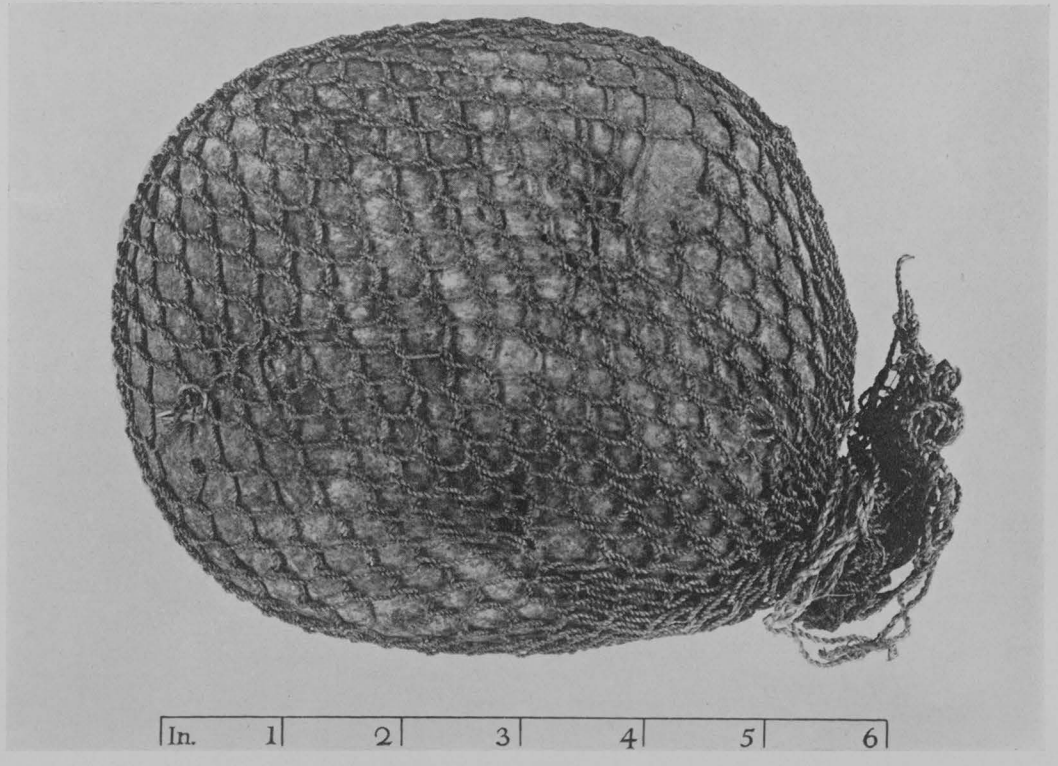
netting was wrapped around a large mano, and has been previously discussed (Plate XVI). Another interesting net is conical in shape, somewhat like a small butterfly net, and made with the slip-knot technique. Its use is problematical. The net wound around seven sticks is described elsewhere in this paper (page 31).

Thomas' study of the nets obtained from this shelter resulted in bringing to light the following facts:

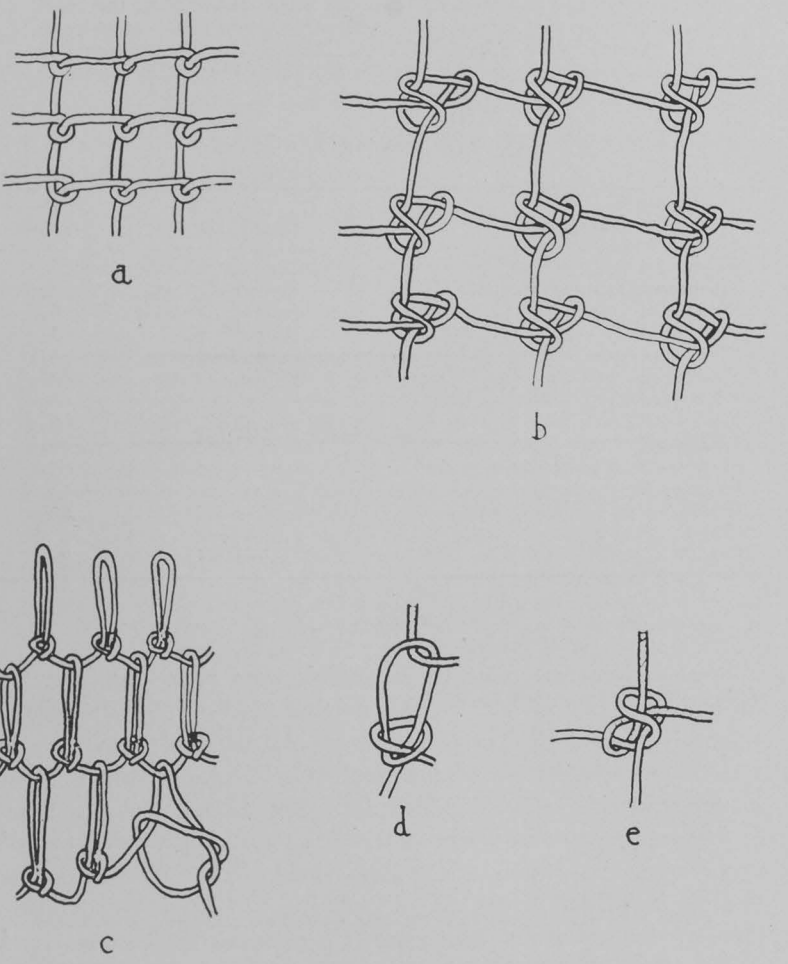
> Three types of knots were used in the weaving. Three specimens using the grass materials were woven with the larks-head knot. When splicing was necessary, the square knot was used. Of eleven specimens of fiber cord nets, three were woven with the larks-head knot (Plate XVII b), and six were worked out by a series of loops (Plate XVII a). Two examples of network were woven from a series of slip-knot loops (Plate XVII c) with a mesh averaging five-eighths of an inch. This type of net is identical with the specimen found by Mr. Coffin in Brewster County, Texas.[29]
>
> It is easy to understand the use of loops in net-making, but the use of the larks-head knot is more difficult to understand. With the aid of Mr. C. E. Kuhlman, an ex-naval academy student, this latter system is explained in two steps. The first step was to make a slipknot loop

[29]Coffin, *op. cit.*, p. 40.

PLATE XVI



A fine specimen of fiber-cord net wrapped around a large mano and tied. Found at a depth of 6 inches, and 2 feet from the wall. The mesh of the net averages ¼ of an inch.



"Net Techniques"

From Thomas, *op. cit.*, Fig. 2.

Various net techniques employed. (a) A series of loops; (b) larkshead knots; (c) a series of slip-knot loops; (d) and (e) illustrating two steps in arriving at the larkshead knot. [(c) is drawn after E. F. Coffin, *op. cit.*, p. 40.]

over another string (Plate XVII d). The second step consists of carefully drawing the slipknot taut, and when taut, pulling the catch loop over the pulled second string. The result of such an operation is the larks-head knot (Plate XVII e). Among the net fragments at The University of Texas Museum are specimens illustrating all stages of this operation.

MATERIALS, KNOTS, AND MESH

Material	Knot Used	Mesh—Inches
Fiber cord	Loops	1/4
Fiber cord (around mano)	Loops	1/4
Fiber cord	Loops	1/4
Fiber cord	Loops	1/4
Fiber cord	Larks-head	1/4
Fiber cord	Slipknot	3/8
Fiber cord	Loops	1/2
Fiber cord	Slipknot	5/8
Fiber cord	Larks-head	5/8
Fiber cord (around seven sticks)	Larks-head	3/4
Fiber cord	Loops	1
Grass	Larks-head	1 1/2
Grass	Larks-head	1 1/2
Grass	Larks-head	2

SANDALS

One hundred forty-nine yucca sandals were recovered from the excavation in this shelter. Of that number ninety-seven were whole, or nearly so, and fifty-two fragmentary. All the sandals that are in a sufficiently good state of preservation to determine the original shape seem to have been rectangular. But the heel ends of some of them are now so worn and tattered as to present a rather ragged appearance. A majority of them are made of split Spanish dagger (*Yucca treculeana* Carr) or of lechuguilla (*Agave lechuguilla*) leaves, but a few are of bear grass (*Yucca tenuistyla* Trelease) and yucca (*Yucca rupicola* Scheele), or other types of the narrow-leafed yucca.

A preliminary examination of the sandals readily disclosed two distinct types. A careful study of all the specimens by Thomas brought to light a third type, differing in one important respect from one of the other types. Based on the framework, the types may be designated as follows:

Type I—Split-leaf warp element.

Type II—Bi-parallel warp elements.

Type III—Opposed warp elements.

Most of the sandals of types I and II are of heavier frame-work than those of type III (Plate XVIII a and b).

No true checker-weave technique was found among the sandals from this site. A few have reinforcing strands running both across and longitudinally (Plate XIX).

The three sandal types are described by Thomas as follows:

> Type I.—The foundation warp is made from the split leaf of the Spanish dagger (*Yucca treculeana* Carr). The leaf is split up from the base about two-thirds of the entire length; the point is then doubled back to form a central warp for the future sandal (Plate XX, Type I). Spanish dagger leaves, usually split, though occasionally whole, are horizontally braided in a regular systematic technique—over the side warp, under the central warp, over and double back under the other side warp and over the central warp. Additional strength is then given by vertical braiding, care being taken that the smooth side of the leaf is up. In this vertical reënforcing there is no regular method used; the strands are applied in a most haphazard manner up and down the entire length of the sandal (Plate XXII B-f). Quite a few of these strands pierce the horizontal braids, and always the toe and heel are bound and squared by loops of this vertical sewing. . . . Twenty-one specimens of Type I were positively identified, and it is highly probable that a large percentage of the seventy-nine undetermined Spanish dagger sandals are of this type, but it was impossible to classify all without destroying the specimens.
>
> Type II is similar to Type I in all respects except that the warp of the sandal consists of two separate leaves (Plate XX, Type II). Type I, without exception, is made up of Spanish dagger leaves. Type II may be made from several species of yucca. The warps are made of yucca leaves, which are folded back to form the central warps, the base of the leaves forming the side warps. Braiding and reënforcing is similar to Type I; the two central warps are treated in the same manner as the single warp of Type I. No effort is made to separate the two central warps.
>
> Type III (Plate XX, Type III) is found in the majority of the lighter weight sandals made from the leaves of the lechuguilla (*Agave lechuguilla*) and bear grass (*Yucca tenuistyla* Trelease). This type was woven from two opposed warp elements. Weaving begins at the toe, the flat strands regularly criss-cross at the heel. No evidence was observed of turned or twisted strands.
>
> Reënforcement was applied in the same manner as in Type I. Thirty specimens of Type III are all that are present in the returns from Fate Bell Shelter. There is no evidence of Type III to be found among the seventy-nine undetermined specimens. This type conforms to the description of one of the types found in the Big Bend region (Brewster County) by Coffin.[30]

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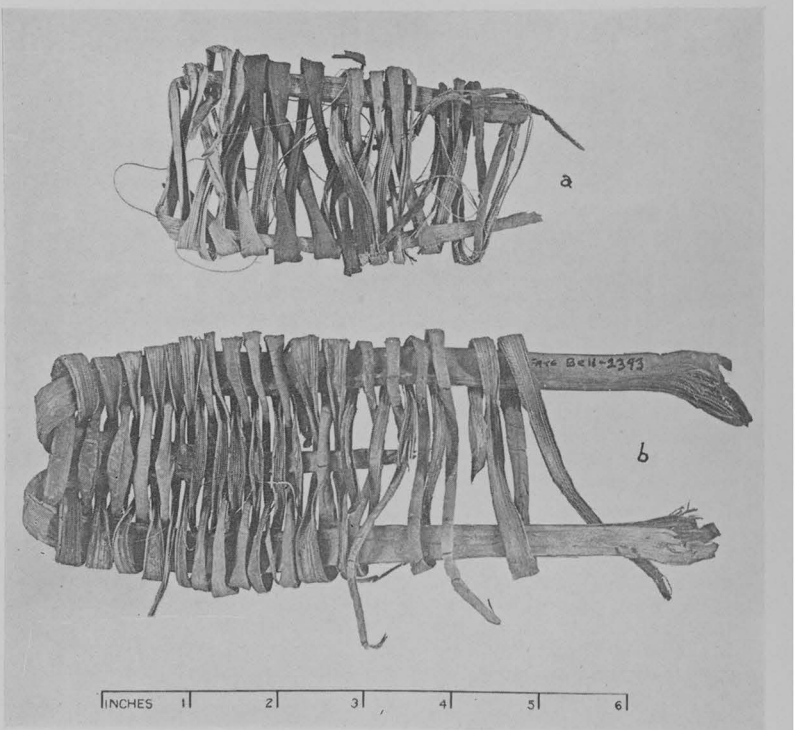
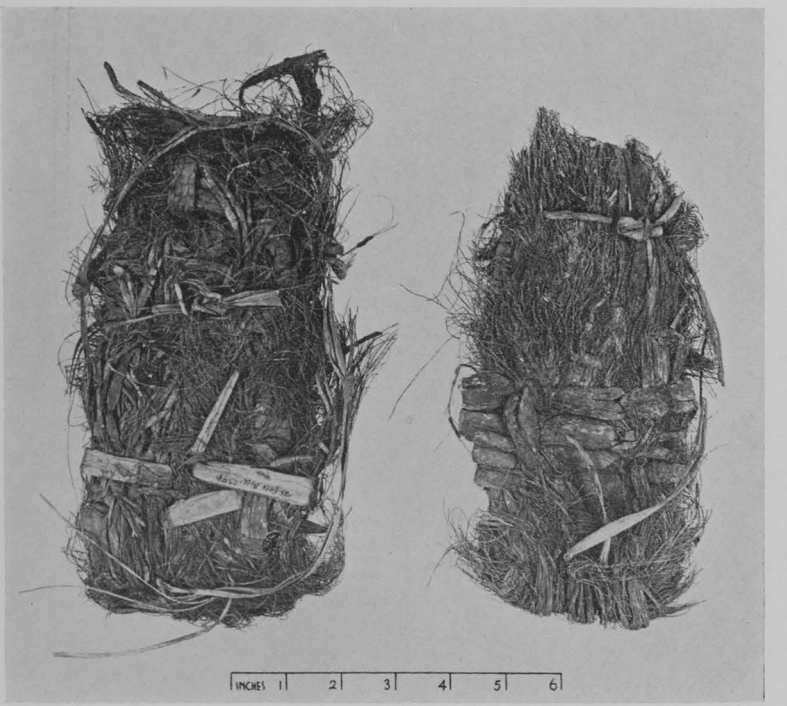
[30] *Op. Cit.*, fig. 9, p. 47.

PLATE XVIII

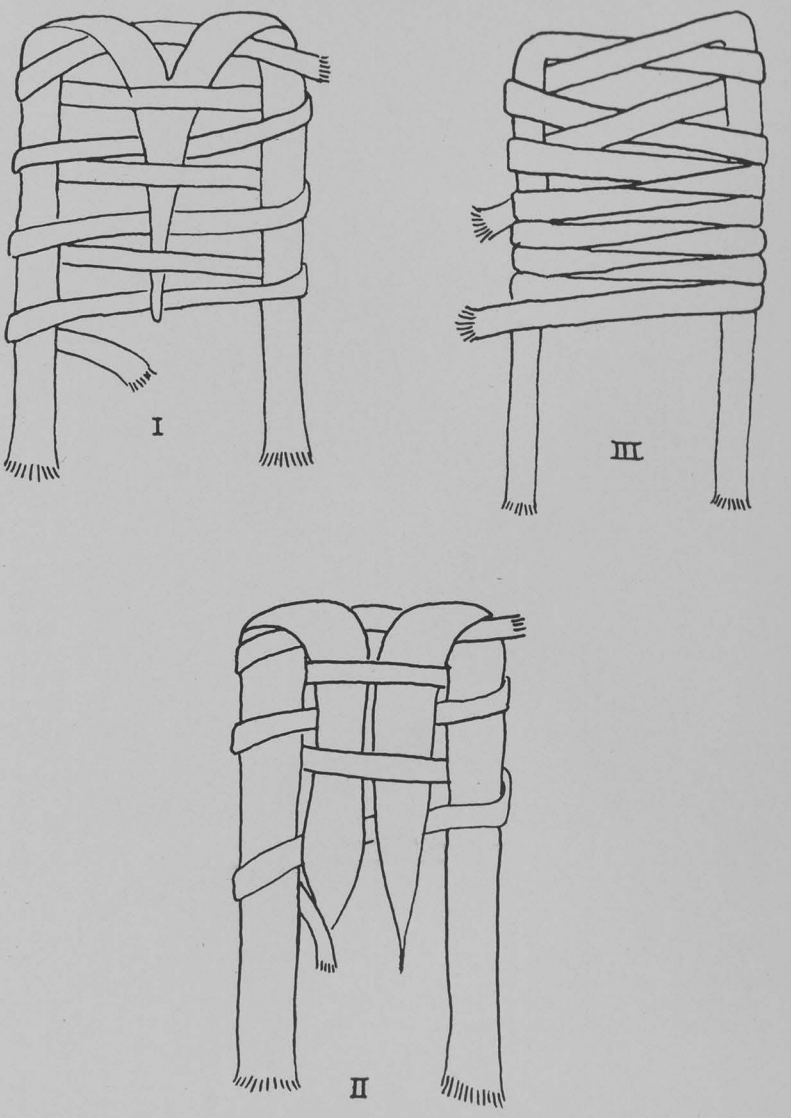


Sandal frames, showing the first stages in manufacture. (a) Type III, opposed warp elements; (b) Type I, split-leaf warp element. Note the technique employed in forming the warp in each type.



Yucca sandals, showing the use of reinforcing strands. Note the loop bindings on toe and heel.

PLATE XX



~SANDAL · TYPES~

Three types of sandal frames used in the manufacture of footwear. Type I, Split-leaf warp element, is employed in about 50 per cent of the sandals; Type II, Bi-parallel warp elements, in 30 per cent; and Type III, Opposed warp elements, in 20 per cent.

After careful study of each of the seventy-nine undetermined Spanish dagger specimens, I believe I am justified in assuming that the same ratio, twenty-one of Type I to ten of Type II, exists in these probable specimens, as positively no opposed element type is found among them. Basing my conclusion on the above ratio, I presume that Type I is represented by 50 per cent of the specimens, Type II by 30 per cent, and Type III by 20 per cent.

CLASSIFICATION BY TYPES AND MATERIALS

Warp Elements	Spanish Dagger	Other Yucca	Total
Type I (Split)	21	....	21
Type II (Inverted UU)	10	9	19
Type III (Opposed)	12	18	30
Undetermined (I and II)	79	....	79
Total	122	27	149

SIZES OF SANDALS

Number Measured	Condition	Average, in Inches		
		Width	Length	Thickness
86	Almost whole	3.65	7.94	¼
28	Complete	3.71	8.30	¼

The smallest complete sandal found was 2½ inches wide and 5 inches long. The largest one measured 5¼ inches wide, 10 inches long, and ½ inch thick. Two slightly worn sandals were ½ inch in thickness.

In nearly every case, as indicated by the average sizes, the sandals are approximately half as wide as long. But in one instance the frame for a child's sandal was 4½ inches long and only 1½ inches wide. When completed the width would have been slightly greater.

SANDAL TIE STRINGS

Many of the sandals have the tie strings still in place. No tie string of fiber cord has been found at this site. All are of yucca leaves, with some split Spanish dagger and lechuguilla, others bear grass (Plate XXI).

With regard to the methods of attaching tie strings Thomas states the following facts:

> . . . With rare exception, the toe string pierced the central warp or warps. A large percentage of the tie strings were attached to the sandal as illustrated in Plate XXII D. Forty-eight specimens showed the use of the square knot in attaching tie strings under the toe. Only one instance was found where two separate overhand knots were used. Nineteen used the loop. Two of the loop specimens, however, were tied and spliced immediately before the twist side attachment was reached. This latter method is similar to a type found in Brewster County, Texas.[31]
>
> Another type of splicing tie strings at the toe is illustrated by nine specimens (Plate XXII, C–h) where the knot is on top of the sandal.
>
> The heel strap was invariably tied with a square knot (Plate XXII, D–k), with one exception, where a half-bow knot was used. As a rule, the heel strap was continuous with the rest of the tie string; but Plate XXII, B–e) the strap joined the toe string at the twist. Three examples of this method of attaching were found with one end of the heel strap braided into the sandal frame before joining the toe string at the twist. Another method, which is a solitary exception, of heel strap attachment is illustrated in Plate XXII, A–b.
>
> The side attachment was usually similar to that shown in Plate XXII, D–j. The attaching string, completely encircling the outside warp element, was twisted one or two turns before separating into heel and toe strings. Another method (Plate XXII, C–g) was that of having the outside warp of the sandal frame pierced by the toe string from the under side; coming out at the top surface, it was inserted under the toe string before continuing towards the heel.

Approximately 95 per cent of the sandals came from the upper level; 4 per cent from the middle level; and 1 per cent from the bottom level.

Most of the sandals are well worn, but in only a few cases does it seem that a sandal was used exclusively on either the right or left foot.

No sandals of woven cord or of skin were found.

There are some notable contrasts between the sandals from this shelter and those from the regions farther west. The toes and heels of these specimens are square. Professor Smith of Sul Ross State Teachers' College, Alpine, states that typical square-toed sandals are missing from his Big Bend collection.[32] All the sandals from Site No. 1, Seminole Canyon, are strikingly different from the so-called "fish-tail" sandals in The University of Texas collections which came from Bat Cave, in the Diablo Mountains in the edge of Hudspeth County near the Culberson County line.

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[31]Coffin, *Ibid.*, p. 50, fig. 12.

[32]Victor J. Smith, *The Relation of the Southwestern Basket Maker to the Dry Shelter Culture of the Big Bend*, pl. 13, p. 59.

Although Type III with opposed warp elements has been found in Brewster County, both Coffin[33] and Setzler[34] report sandals from that region that vary decidedly in technique from Types I and II in Seminole Canyon. Roberts also reports different sandals in the El Paso region.[35]

Matting

Fragments of matting to the number of 169 were found in the camp refuse of this shelter. Most of them came from the upper eighteen inches in the deposit, although a few charred fragments were found in the middle and bottom levels. The sizes of the pieces vary from scarcely an inch square to 17 inches long and 11 inches wide. The average is 7 by 4 inches.

The specimens divide themselves into three types, based on the weaving technique (Plate XXIV). They are as follows:

Type I—Over-one-under-one, or checker weave.

Type II—Over-two-under-two, or twilled weave.

Type III—Grass mat with wrap-woven edges and warp strands of fiber cords piercing the blades of grass.

Thomas, who made a detailed study of each fragment of matting, discusses the types as follows:

> Type I is represented by 121 specimens, which may be divided according to the material used: Sotol, 47; lechuguilla, 38; and sacahuisti, 36. All specimens that show an edge are of a diagonal checker weave. That the true vertical-horizontal checker-board pattern existed among the other mat fragments is possible but highly improbable. The number of strands to the inch varies from one and one-half to twelve. Four of the specimens have yucca leaf loops attached to the corners, and one has a fiber cord vestige piercing its border.
>
> Type II, the twilled, over-two-under-two specimens, was represented by forty-seven fragments. This type, as a rule, is made of the smaller grasses; forty-two are of sacahuisti and five are of lechuguilla. One of the sacahuisti mat fragments of this type was found folded over the remains of the infant burial L–1.
>
> Type III.—Only one large fragment of this type was found. The edges of the specimen were bound together by a twisted fiber string twined about the ends of the leaves. Two inches from the edge a

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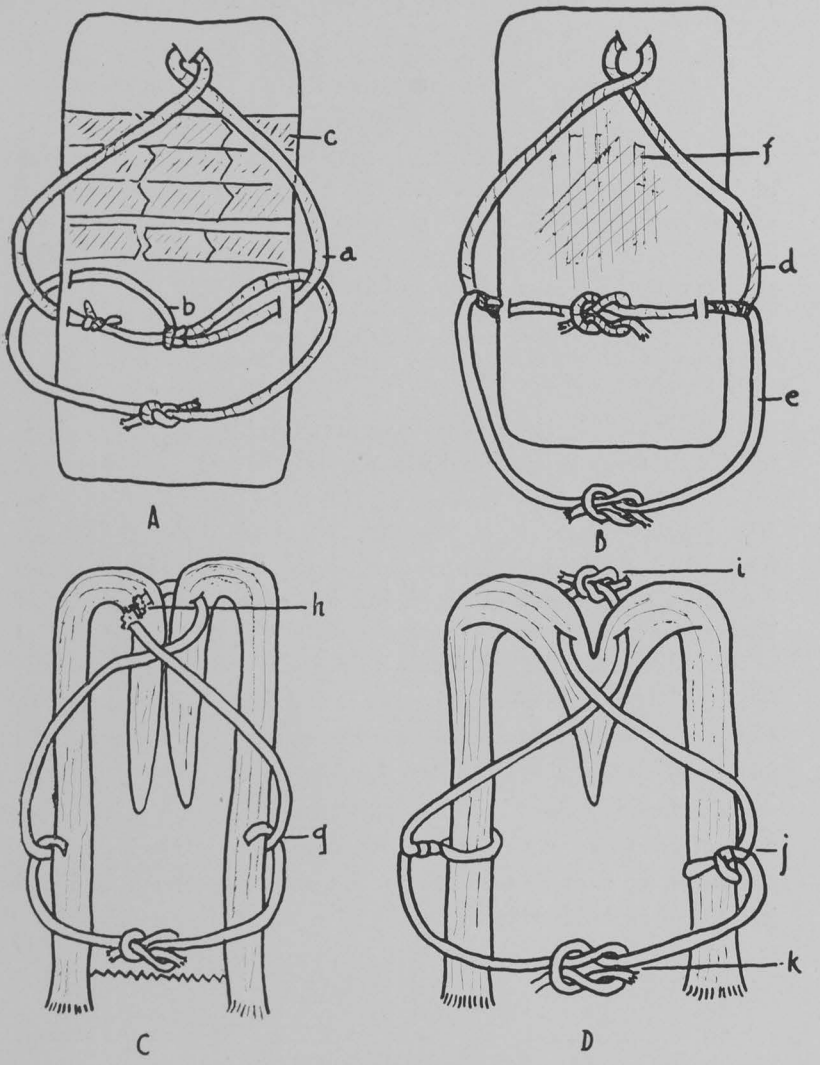
[33]Coffin, *op. cit.*, pp. 43–51.

[34]Setzler, *op. cit.*, p. 56.

[35]F. H. H. Roberts, Jr., *Recent Archaeological Developments in the Vicinity of El Paso, Texas*, Smithsonian Miscellaneous Collections, LXXXI, No. 7, pl. 2, figs. 5, 6.

PLATE XXI

Yucca sandals showing well preserved tie strings. Note the manner of attaching the strings, also the knot of grass on the top surface at the toe string of (b).



"TIE STRINGS AND REINFORCING"

Tie string and reinforcing techniques used in sandals. (A, a–b) Solitary exception of heel attachment; (A, c) method of reinforcing; (B, d–e) heel strap joined toe string at the twist; (B, f) reinforcing; (C, g) outside warp of sandal frame pierced by toe string from under side; (C, h) type of splicing tie strings at toe, knot on top of sandal; (D, i) square knot used to attach tie strings under toe; (D, j) usual method of side attachment of tie strings; (D, k) heel strap almost invariably tied with a square knot. Many of the tie strings were attached as illustrated in (D).

> fiber cord was threaded through the triangular culms, and other similar cords were likewise threaded through the leaves at intervals of four to six inches.

The single specimen in Type III was found over the rock covering of burial L–5 (Plate XXIII a). Indications are that originally it was at least twenty-nine by sixteen inches in size. The leaves are decidedly triangular in shape, with each side ¼ inch wide. Dr. Gilmore reports on this specimen as follows:

> . . . Made by perforations in the triangular culms of a large sedge, seeming to be *Carex* sp., through which were threaded cords twined from the fibers of *Agave lechuguilla*.[36]

The use to which this specimen was put is problematical. It appears too fragile to have been used where weight or strain was required.

In the Anthropology Museum of The University of Texas is another grass mat that falls in Type III. It was recovered by amateurs from a rock shelter in Seminole Canyon (Map II, Site No. 2, three-fourths of a mile south of the shelter worked by The University of Texas. It is made of the narrow-leafed cattail *(Typha augustipholia)* which has a somewhat flat leaf with slightly convexo-concave surfaces. The grass is pierced by two-strand fiber cords ⅛ inch in diameter. The manner of fastening the ends by wrap-weaving differs in the case of flat and triangular leaves.

Coffin found in Bee Cave Canyon, Brewster County, Texas, a fragment of grass mat held together with fiber cords in much the same manner as the ones discussed above. He states that the one he found is made of an unidentified grass.[37]

Basketry

Sixty-three fragments of basketry were obtained from the shelter. They came from the debris of the upper level and were associated, in many cases, with fragments of matting. Most of the pieces are very small, and some are charred.

Setzler, to whom samples of basket fragments from this shelter were submitted, wrote as follows:

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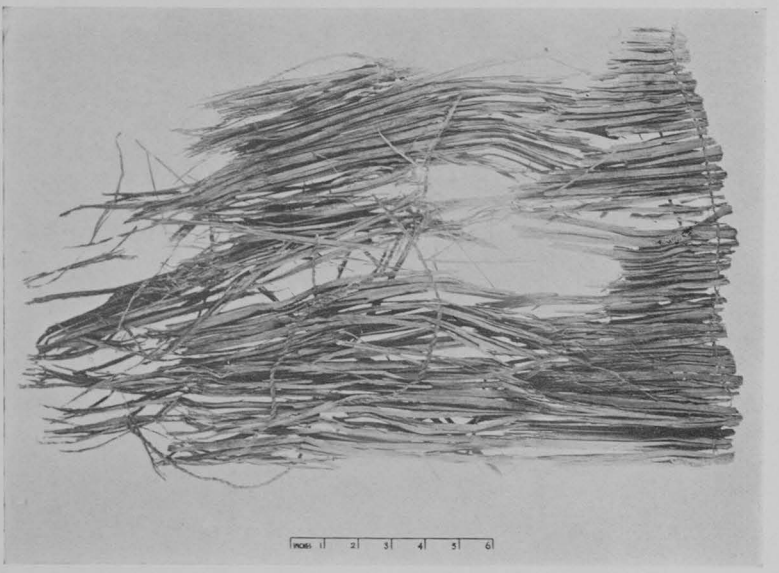
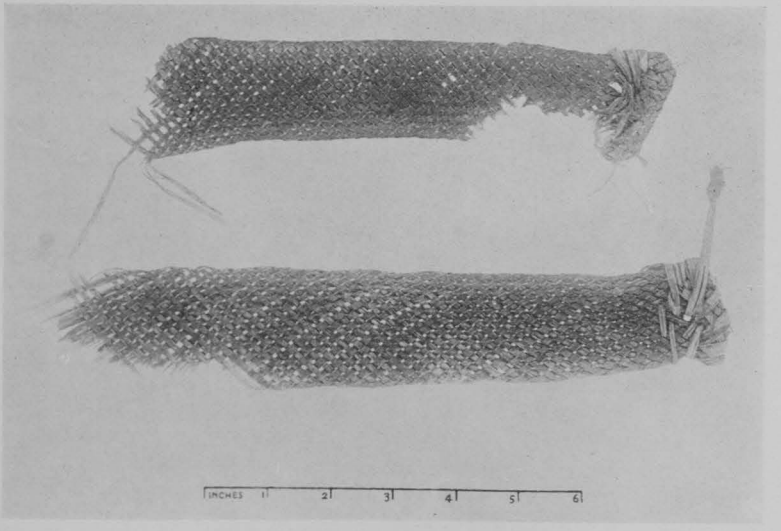
[36]Gilmore, *op. cit.*

[37]Coffin, *op. cit.*, p. 36.

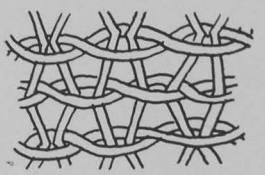


(a) Fragmentary grass mat that accompanied Burial L–5 at a depth of 14 inches. Fiber cords threaded through triangular culms.

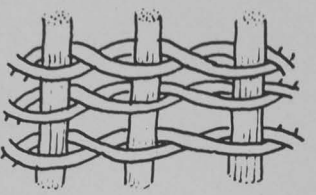


(b) Fragmentary headbands, burden bands, or belts. Note selvage at the ends and the yucca leaf string.

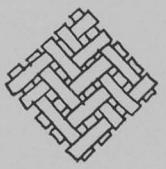
PLATE XXIV



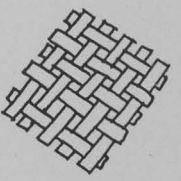
"TWILLED·TWINE"



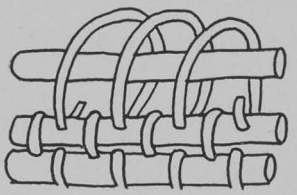
"PLAIN·TWINE"



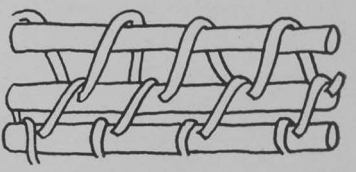
"TWILLED"



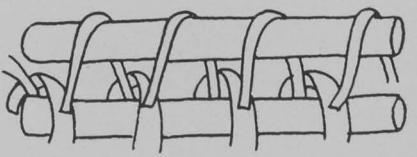
"CHECKERWEAVE"



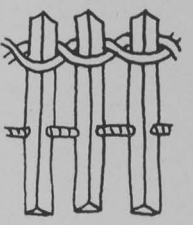
"NON-INTERLOCKING"



"INTERLOCKING"



"SPLIT·STITCH"



"UNUSUAL·MAT·WEAVE"

Various mat and basket weaving techniques. The matting weaves include checker-weave, over-one-under-one; twilled weave, over-two-under-two; unusual weave, triangular grass culms threaded with fiber cords. The basket weaves are twilled twine; plain twine; coiled. The coiled is separated into interlocking stitch, non-interlocking stitch, and split stitch.

> The samples which you have sent me are very similar to those found in both Brewster and Presidio counties. Two of the samples consist of a single bundle foundation with an interlocking stitch, a type of coiled basketry which is considered by Dr. Weltfish as being intrusive to the Southwest. One important difference between (your specimens and those of) the Big Bend interlocking type of coiled basketry, however, is that the foundation consists of bundles of grass while that of the Southwest is a single rod. The third sample is a simple twined basket fragment.[38]

Three of the four types of basket techniques found by Setzler in Brewster County were likewise found by us in the Fate Bell shelter in Val Verde County.[39] They are the plain twining, split stitch with single bundle foundation, and single bundle foundation with interlocking stitches.

From a depth of 5 inches, near the center of the shelter, came half of a water-proofed basket bottom. Its diameter is 3 inches. The specimen still retains a gum-like substance well plastered over one side. This would be at present water-proof (Fig. 22 a).

Thomas made a detailed study of the basket fragments and reported thereon as follows:

> Forty-three fragments of basketry were coiled, twelve were twined and six were twill-twined. The coiled basket foundations (Fig. 22) are of two types, multiple grass bundles and bundles of lechuguilla leaves usually split. Superimposed stitching for reënforcing seems to have been practiced on the bottoms of baskets, as these additional heavy stitches are present on the specimens excavated; and, also, on another basket purchased from a collector of this region, and obtained from a nearby shelter (Plate XXVI).
>
> Only one small fragment, which I feel fairly certain is a portion of the topmost coil, gives a hint of the method used in the selvage of the basketware. The fragment has three layers of coil foundation in which the coil above is attached to the foundation of the one below by a non-interlocking stitch. The stitch on the top foundation bundle is given an extra loop between every stitch that pierces the bundle beneath.
>
> Coil ware may also be classified as to stitching types (Figs. 22 and 23), such as:
>
> A. Interlocking stitch, represented by twenty-six specimens.
> B. Non-interlocking stitch, represented by thirteen specimens.
> C. Split stitch, represented by five specimens.

---

[38]F. M. Setzler, Letter to A. T. Jackson, Jan. 4, 1933.

[39]F. M. Setzler, "Prehistoric Cave Dwellers of Texas," *Explorations and Field Work of the Smithsonian Institution in 1932*, p. 55.

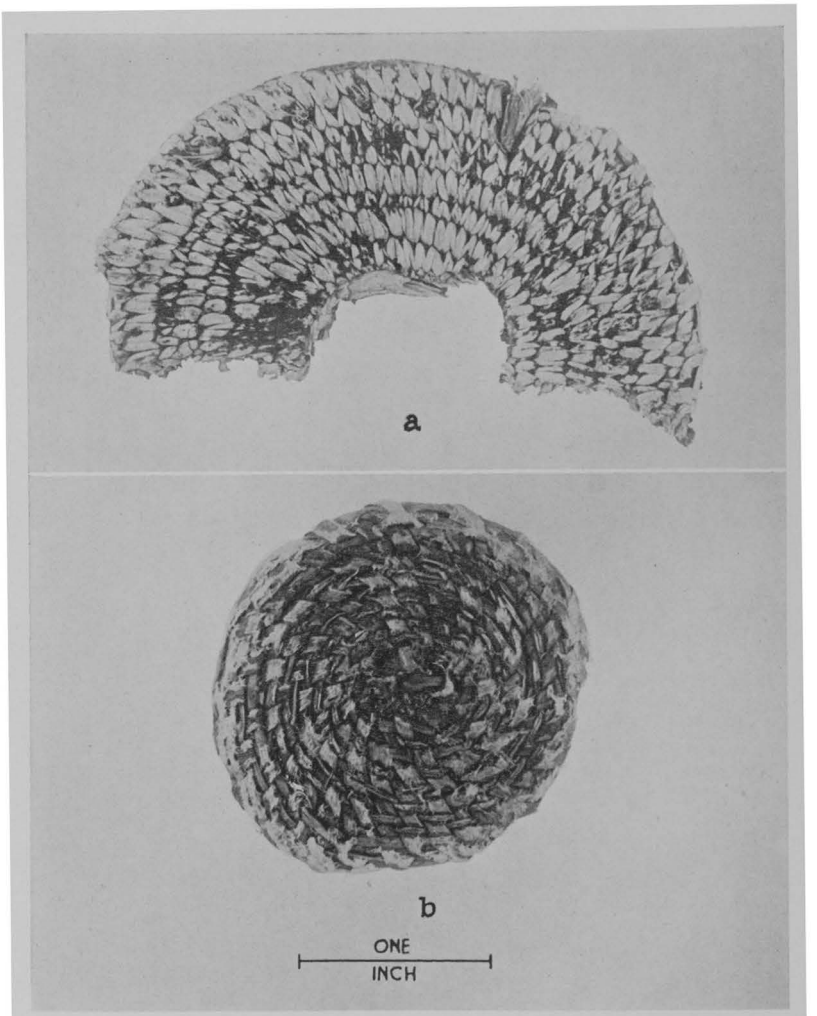


Figure 22. Fragments of basket bottoms. (a) Split-stitch technique; reverse side verse side water-proofed. (b) Coiled ware with interlocking stitch.

The spacing of these stitches varies from two to nine to the inch. Occasionally, although very rarely, a split stitch is seen in the stitching of Types A and B. The foundations of the coiled basketware, as may be observed, have both the multiple grass splints and the leaf classes. The leaf foundation, a foundation consisting usually of a bundle of four or five split lechuguilla leaves; is used in twenty-six of the coil ware specimens.

Twined basket fragments all have a multiple splint foundation of three to eight splints each, and vary in the spacing of weft from six

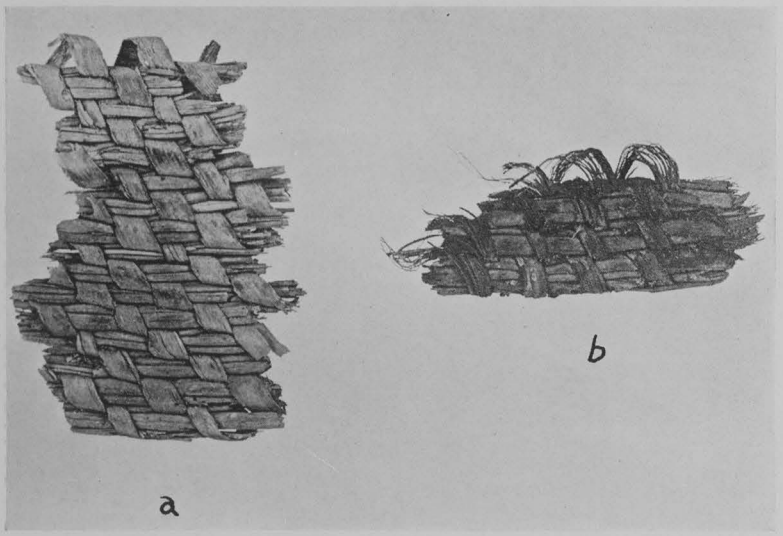


Figure 23. Basket fragments from debris of upper level. (a) Coiled ware with interlocking stitch; woven from leaves of *Nolina* sp. (b) Coiled ware with non-interlocking stitch. Photograph natural size.

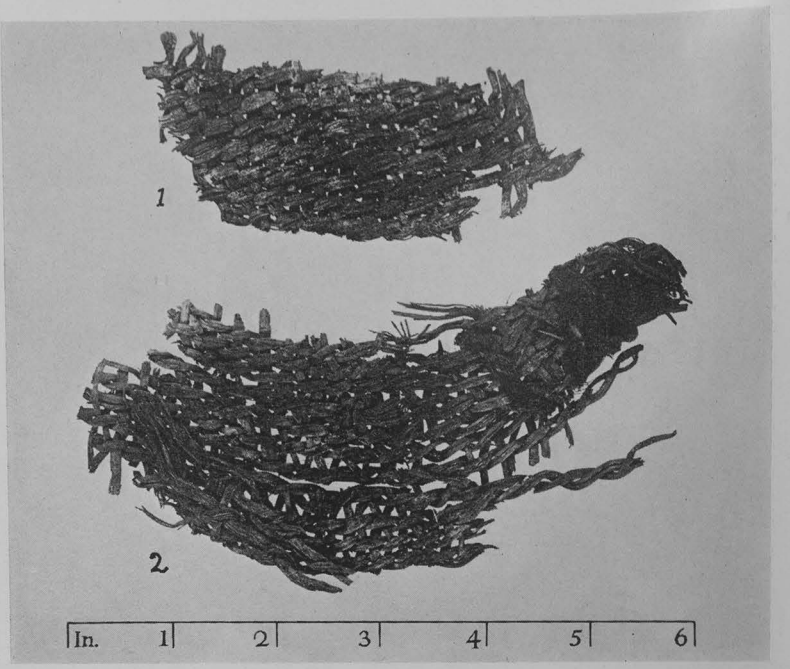
to thirteen to the inch. As a rule, the twining element is increased in size toward the top. One large specimen (Plate XXV b–4) measures, for the top three rows, only six weft elements to the inch; in the next row, the weave is different from the plain twining of the rest of the basket and is woven with a skip stitch of over-two-under-one; nineteen rows further, the skip stitch again appears among the plain twined elements, measuring eight to the inch; the balance of the elements decrease in size towards the bottom, where they measure twelve to the inch. One other fragment of plain twined basket ware has a skip stitch running through it, evidently for decorative purposes.

An unusual and unique fragment has a spoke fragment of grass splints spaced three-sixteenths of an inch apart, and the weaving element spaced one-third of an inch apart. This specimen is highly suggestive of the sifter type baskets of the Southwest.

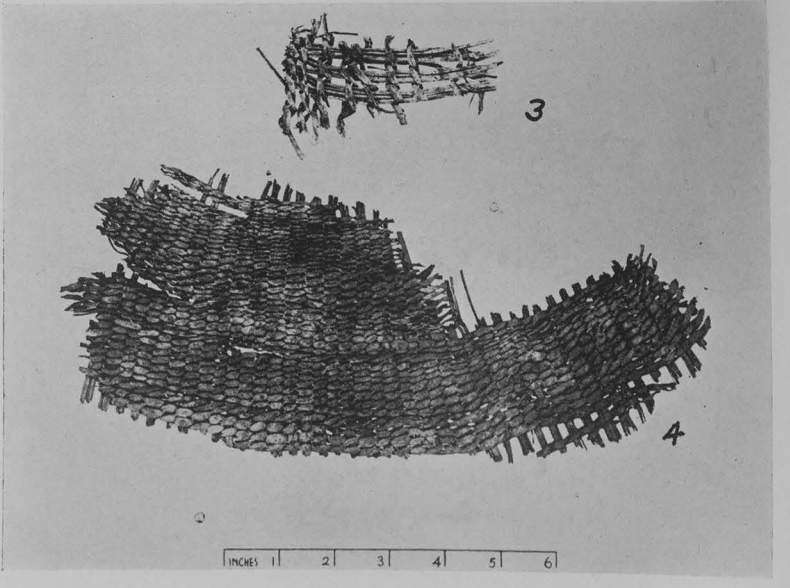
Six specimens of twilled-twined basket fragments were found (Plate XXV a). The spokes and weaves consist of split yucca leaves. The weaver, as a rule, is consistent in the movement of over-two-under-two, one element separating the double spoke and the element above looping the separated spokes together again. One fragment of this type has seven strands gathered into a tight bundle at one corner by a triple wrapping with a fiber cord which is suggestive that a basket of this type was flexible and varied in its uses.

All of the basket fragments are too small to attempt any definite conclusions as to their original uses, sizes, or shapes. Most of them are so fragile from charring and use that intimate study was interfered with, for fear of destruction to the specimens.

PLATE XXV

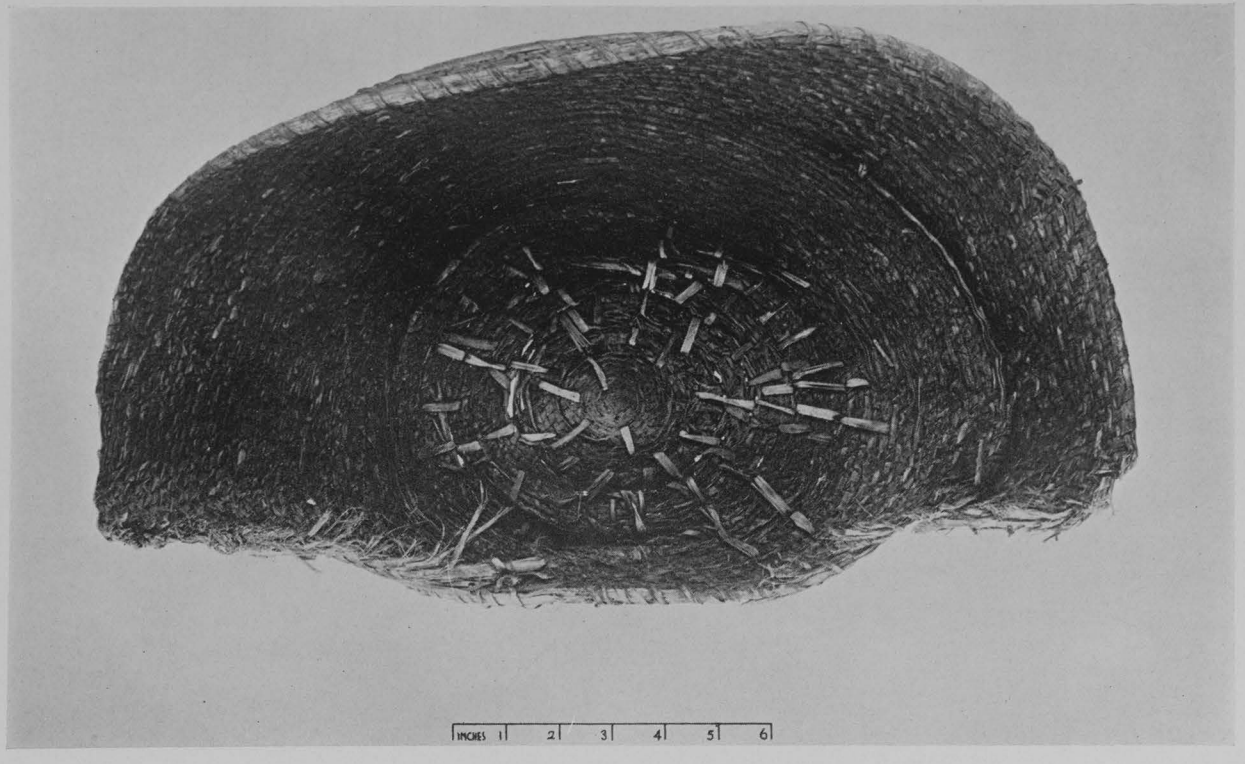


(a) Basket fragments woven from leaves of *Yucca rupicola* Scheele. No. 2 repaired by use of small fiber cords. Twilled twine technique. Note the separation of the spokes.



(b) Basket fragments: No. 3 from a possible twined sifter basket; No. 4, plain twined technique, showing use of the skip-stitch for decorative purposes.

PLATE XXVI



Basket of coiled ware employing the interlocking stitch. Note that the bottom has superimposed stitching for reinforcing. Specimen purchased from a collector who secured it from a nearby shelter.

Nearly all of the basket fragments came from the debris of the upper level; a few were discovered in the middle and bottom levels. Those from the bottom level were in a very bad state of preservation.

Headbands, Burden Bands, or Belts

Sixteen fragments of so-called headbands, "burden bands," or belts were found in the rubbish of the shelter, all of them coming from the upper 15 inches in the deposit. Ten of the fragments appear to have been from finished burden bands or belts; six were unfinished. No complete bands were found (Plate XXIII b). The fragments vary in length from 4 to 15 inches. In width they range from 1¾ to 2¾ inches, with an average of 2 inches. None came from a grave, so that proof of their use is lacking. The bands are woven from sacahuisti grass (*Nolina texana* Watson) and bear grass (*Yucca tenuistyla* Trelease).

The weaving technique, which was studied by Thomas, is analyzed by him as follows:

> Five of the unfinished and five of the finished fragments are woven with the diagonal checker weave, one-over-one-under. Five of the finished fragments are woven with the twilled, two-over-two-under, weave. One unfinished specimen has a unique weave, a one-over-one-under pattern with the weaver completing one movement and doubling back for further continued activity. This solitary specimen is the only positive vertical-horizontal weave found. All of the burden bands, mats and woven straps that have a border are diagonal in weave.
>
> In the twilled bands the number of stitches to the inch varies from six to nine, and in the checker weave type from three and one-half to five to the inch. Three of the specimens have one completed end. The technique in reënforcing these ends seems to have been to double the end of the band over and secure it with heavy stitches. A yucca leaf, knotted loop, was found inserted in the end of several of the bands. No evidence of woven or cord attachments for the ends was observed. The selvage was only the turned-back ends of the weft.

Unusual Woven Objects

The most unusual woven object, the only one found, consists of a plaited article, square in cross section, made of four strands of sacahuisti grass. Its total length is 3½ inches, with an actual woven part 1½ inches long and ⅜ of an inch on each edge. The four strands are bound together at one end by wrapped fiber. The use to which the specimen was put is problematical.

There were found eight narrow braids of lechuguilla leaves, consisting of four or six strands woven tightly in the diagonal checker-weave pattern. All are unfinished. Their use is also problematical.

Two lechuguilla leaves were tied with a square knot at one end, then the two strands were formed into a series of eight loops and fastened at the other end with another square knot. The circles are 1¼ inches in diameter and give the specimen a chain-like appearance.

Bundled Materials

Ten bundles of material, with the original leaf bonds around them, were found in the general digging in the shelter. The materials, which no doubt were intended for use in making baskets, mats, and sandals, consisted of the following: Spanish dagger (*Yucca treculeana* Carr); sacahuisti grass (*Nolina texana* Watson); lechuguilla (*Agave lechuguilla*); sotol (*Dasylirion texanum* Scheele); bear grass (*Yucca tenuistyla* Trelease); brown grass (?) (*Andropogen scoparius*).

All the bundles of material came from the debris of the upper level.

Skins

Twenty-two fragments of skin came from the debris of the upper level. Vestiges of hair and fur remain on several of the fragments. The average size of these fragments is about four by six inches. Nearly all the specimens show evidence of sewing (Fig. 24), and a few retain the fiber-cord lacing. Two fragments bear a trace of red paint. Two pouches, both in a bad state of preservation, were found. One was with burial L–1, the other in the midden deposit. The skin around a bundle of sticks has been discussed.

Ten fiber cords, previously mentioned, were wrapped with rabbit skin (p. 91 and Fig. 20). Other leather or skin fragments are from a variety of animals, such as the deer, buffalo, panther, and others unidentifiable.

Problematical Tied Objects

Fifteen specimens were wrapped and tied with fiber-cord, grass, and sinew. These included nine sticks and reeds wrapped and tied

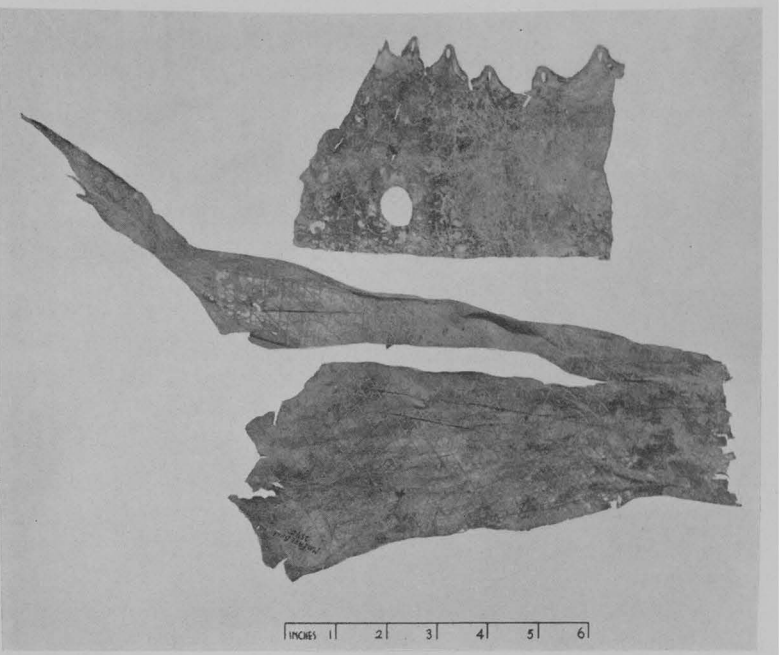


Figure 24. Skin fragments from the debris of the upper level. Note the holes along the edge of the upper specimen and the ornamental lines in the lower.

with cords, three pebbles with grass, a worked bone with yucca leaf (Fig. 25 a), an unworked bone with grass (Fig. 25 b), and a grass stem wrapped and tied with sinew.

Three of the unusual specimens of this type are small unworked stones, varying from 2½ to 3½ inches in length. They are wrapped with grass from two to five times and have the ends tied. One of these (Fig. 26 b) has a cocklebur (*Xanthium echinatum* Murr) leaf folded and wrapped around the large end of the stone. The leaf is securely attached to the stone by being wrapped and tied with grass.

Coffin reports small stones from Brewster County that had been wrapped with grass, and says: "It is possible that these objects were used as charms."[40]

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[40]Coffin, *op. cit.*, p. 24.

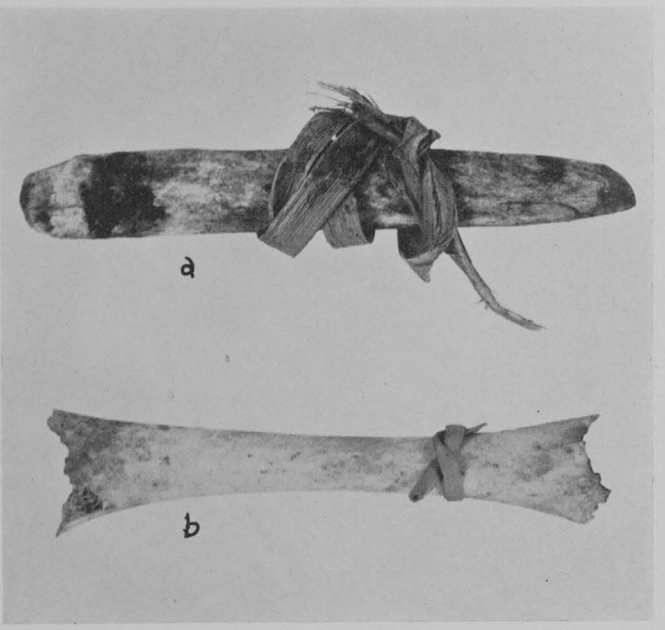


Figure 25. Bones wrapped and tied with yucca leaf and grass. The bone bearing the yucca leaf has been worked down to a spatula-like implement. Photograph full size.

Four bent branches, some ten inches long and one-fourth of an inch in diameter, were peeled and wrapped and tied at one end. It is possible that these were parts of a cradle frame.

A crude small stone was imbedded in a split leaf of prickly pear (*Opuntia*). A wrapping of sacahuisti grass (*Nolina texana* Watson) held the rock in place.

Beads

Seventy-two beads were found in the shelter. They include twenty-five bone, forty-six snail shell, and one crude stone bead (Plate XXVII a and b). These finds have been mentioned at various places in the account of the work of excavation.

The bone beads range in size from ½ inch in length and 1/10 of an inch in diameter to 2 inches in length and ½ inch in diameter.

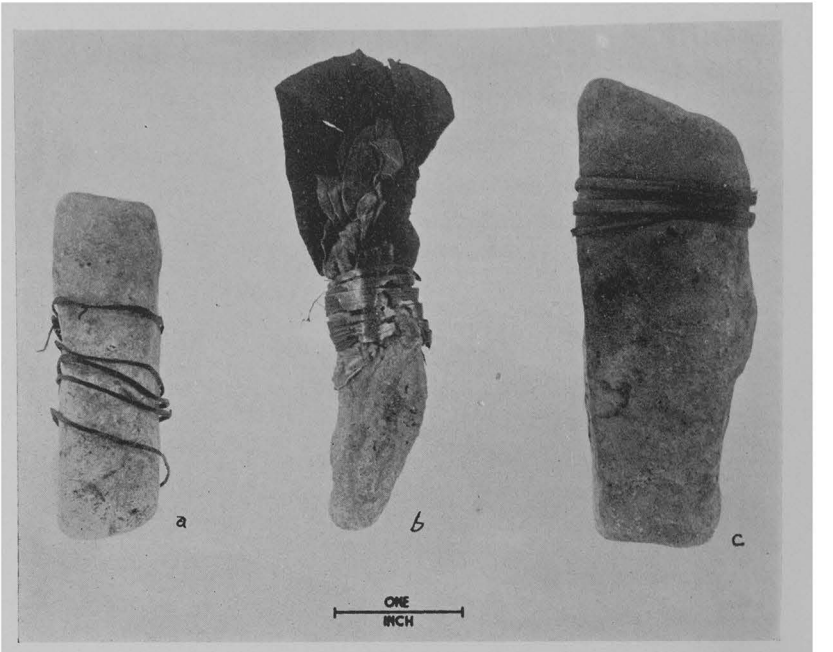


Figure 26. Small stones wrapped and tied with grass. They may have been used as charms.

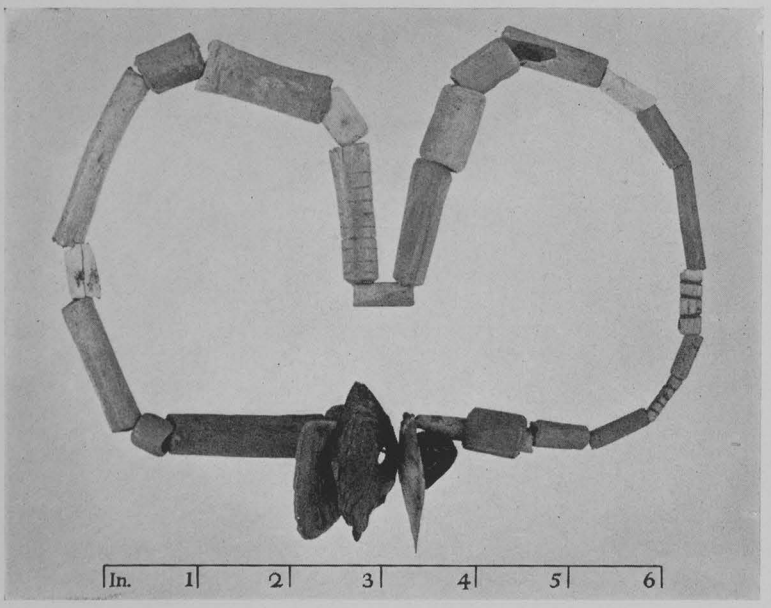
Some are well polished, others roughly cut and unpolished. Several are decorated by means of grooves or rings cut around them. Most of these beads are from the leg bone of the wild turkey. Of the bone beads 74 per cent came from the upper 20 inches in the midden deposit; the remaining 26 per cent came from depths of 22 to 41 inches.

One bead appearing to be made of charcoal seems, on close examination, to be made of the columella of a conch shell, badly charred.

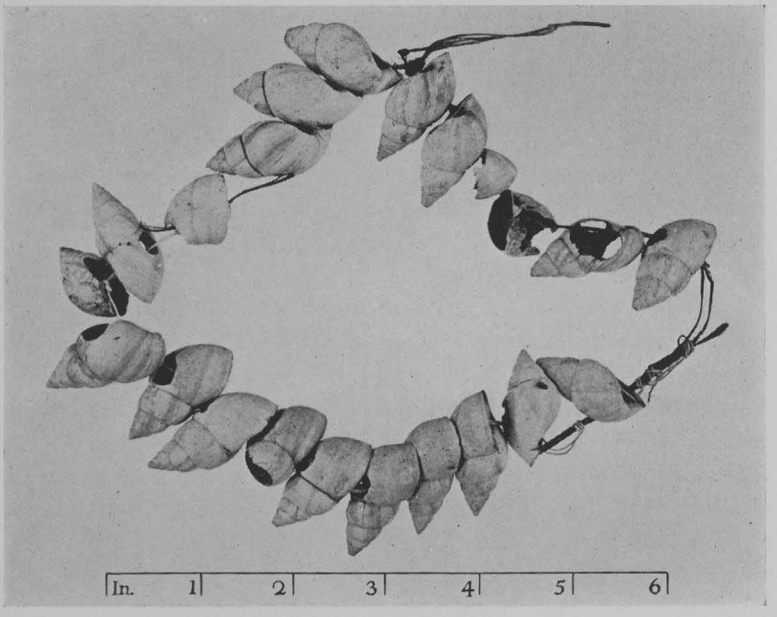
Twenty-one of the snail shell beads were found, as previously recorded, strung on the original grass string (page 20 and Fig. 4).

Shell Work

Some of the important articles of shell have been recorded in connection with the data on excavation. For a description of the



(a) Bone beads and shell pendants recovered from the midden deposit. Note the carved decoration on some of the beads.



(b) Snail shell beads found on original grass string.

Figure 27. Hinged mussel shells with holes drilled for suspension and possible use as rattles. Found in pairs in the midden deposit at a depth of 42 inches.

conch shell gorget see the discussion of burial L–8 (page 70 and Plate VIII b).

There were six worked mussel shells, possibly used as spoons or ladles, and three mussel shell paint containers, in addition to the snail shell beads (Plate XXVII b), the engraved mussel shell (page 44 and Plate VIII a), and the mussel shell rattles (page 64 and Fig. 27), previously discussed.

Two small shell pendants are of considerable interest. One was made by roughly hacking a piece of mussel shell into a rounded shape and drilling a hole below the bivalve hinge for suspension. Another was fashioned from the middle portion of a mussel shell and perforated. In speaking of a similar artifact, Kidder says: "A very small saucer-shaped bead made presumably from the side wall of a large Olivella. This type of bead is particularly characteristic of the Basket-Maker culture."[41]

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[41]Nusbaum, *op. cit.*, p. 82.

Another small pendant was made from a large fish scale merely by drilling a hole for suspension.

Artifacts of Wood and Reed

Shovel. A wooden fire shovel, or scoop-like implement, was uncovered in the trash of the upper level (Plate IX b). It was roughly eight and a half by three and a quarter inches with a thickness ranging from three-sixteenths to eleven-sixteenths of an inch. It was made from the outer peeled surface of the Mountain oak, or Emory's oak, and was charred on one side only. This implement would seem to have been used for carrying coals, scraping dirt and ashes from the fire place.

This shovel is of particular interest, coming from this site, since Kidder states that such implements are typical of the Basket-Maker culture.[42]

Setzler reports similar implements from Brewster County, Texas.[43]

Sticks With Tenon-like Ends. Several round sticks with tenon-like ends were found (Fig. 28). Three were large and two small. The longest of the larger ones was 5¾ inches in length and ⅜ of an inch in diameter. One end was rounded and bore gashes or tool marks that gave a rough surface to the lower end. The upper or tenon end is broken. One specimen is charred at the lower end. A small stick 4 inches long and ¼ of an inch in diameter had a tenon, but the lower end was broken off.

Coffin describes similar finds in Brewster County.[44]

These specimens resemble what Kidder identifies as atlatl foreshafts.[45]

Foreshafts for Atlatl Darts. Two notched pieces of wood, that appear to be foreshafts for atlatl darts, were found (Fig. 29). One is 4 inches long, ⅜ of an inch in diameter, with an end notched to a depth of ¾ of an inch and wide enough to admit a darthead ¼ of an inch thick. It shows unmistakable signs of use in the form of

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[42]Nusbaum, *op. cit.*, pp. 115–116.

[43]Setzler, *op. cit.*, p. 56.

[44]Coffin, *op. cit.*, p. 27.

[45]Nusbaum, *op. cit.*, p. 111.

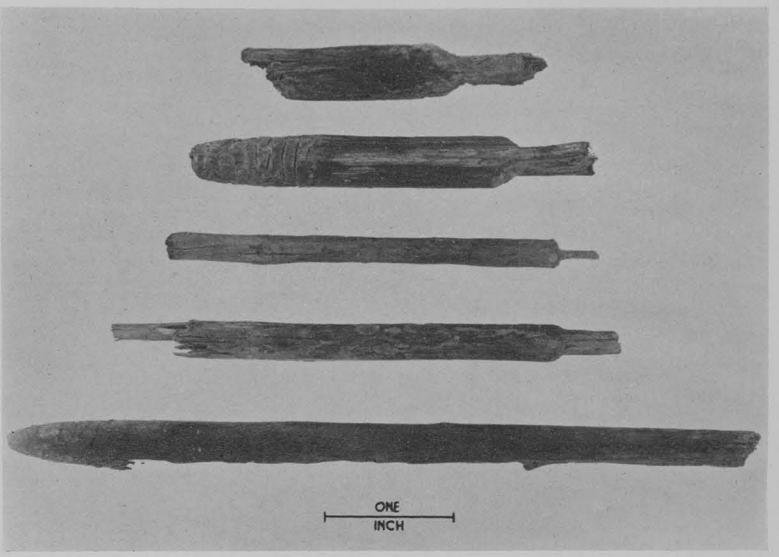

Figure 28. Sticks with tenon-like ends and opposite rounded ends showing tool marks. Found in the debris of the upper level.

incisions cut around to give a grip to the sinew bindings and by a black, gummy material resembling asphalt on the inner sides of the notch. The other end, unfortunately, has been burned off.

The other wooden foreshaft is 13 1/16 inches long, 6/7 of an inch in diameter at the notched end, and tapers for 3½ inches at the

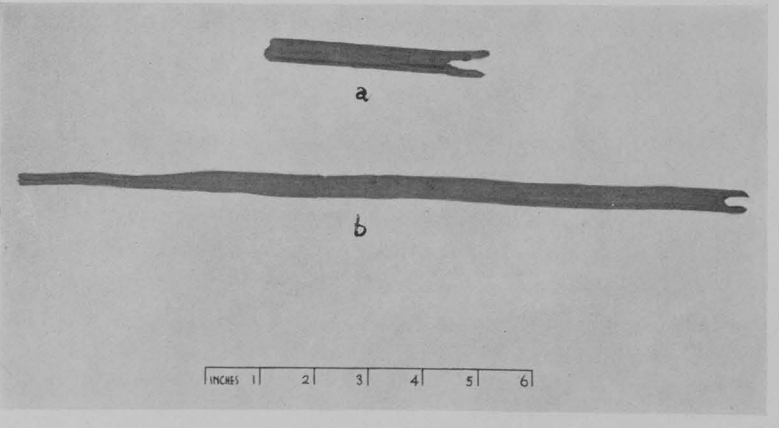

Figure 29. Atlatl foreshafts from depths of (a) 24 inches and (b) 6 inches.

opposite end to a diameter of 3/16 of an inch. It would seem that the base end was tapered to fit into the socketed end of the main-shaft of the dart. The notch is ½ of an inch wide inside. There is evidence of wrapping around the nock end.

These two wooden foreshafts bear a marked resemblance to certain of Nusbaum's finds in Utah which are classed as foreshafts for atlatl darts.[46]

An atlatl foreshaft from Brewster County, Texas, pictured by Setzler is identical with one here discussed.[47]

Problematical Specimen of Sotol Stalk. In discussing a split sotol stalk that came from the debris of the upper level, Thomas says:

> No atlatl was recovered, with the possible exception of a split piece of yucca flowerstalk, fifteen inches long and five-sixteenths of an inch in diameter. This particular specimen was split lengthwise thirteen and one-fourth inches, leaving the butt end one and three-fourths inches long and nine-sixteenths of an inch in diameter. The spur was formed by cutting a groove into the butt of the stock to a point somewhat short of the end, leaving a concave receptacle for a shaft. That this specimen is an atlatl is problematical, but it is suggestive of a crude implement of this type, possibly the work of a child. It is too frail to have served as a weapon.

It is possible that the stick may have been used as a "trigger" for a "dead-fall" snare. The concave receptacle would have lent itself to fitting over the end of the usual upright stick in such snares. The specimen in question having a considerable curvature would also suggest its use in this manner.

Nock Ends of Arrowshafts. Four nock ends of arrowshafts were recovered from the debris (Fig. 30 a, c, d, e). Three are of small reeds and one of undressed wood. The longest reed is 8⅝ inches long and ¼ inch in diameter. The end bearing the notch is in perfect condition but shows signs of much use. The notch is just above a joint in the reed, which gives it added strength. There is now no wrapping on the shaft. The opposite end is crushed. The other two reed nock ends are in bad condition, but both have well formed notches ⅛ of an inch deep and bear the original sinew wrappings or seizings. One is 6⅜ inches long, the other only 3½ inches long, and the diameters are about ¼ of an inch.

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[46]Nusbaum, *op. cit.*, p. 111.

[47]Setzler, *op. cit.*, p. 55.

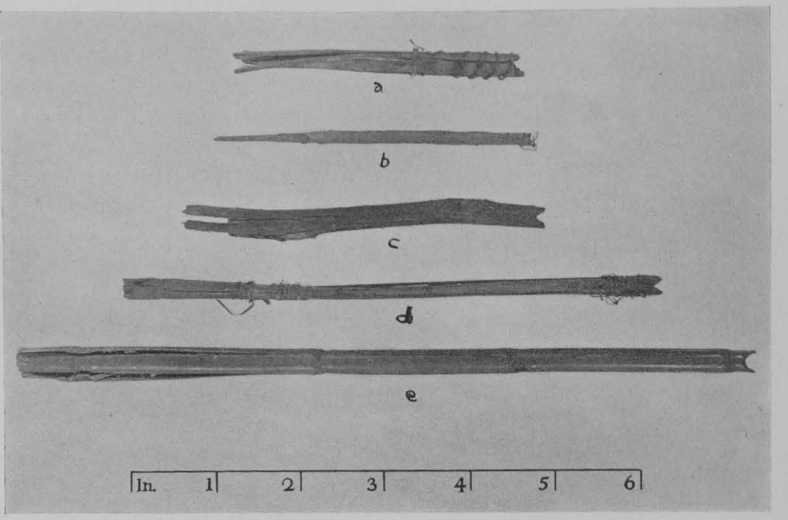

Figure 30. Nock ends of arrowshafts of reed and wood. Specimen (e) is 8⅝ inches long.

The wooden nock end has a notch in perfect condition, but the shaft itself, broken and only 4¼ inches long, is not straight and has two unsmoothed knots, making it appear a rather crude arrowshaft. It bears no evidence of seizings and probably was never used.

A small pointed stick 3¾ inches long and 3/16 of an inch in diameter (Fig. 30 b) is complete with nock end and sinew wrapping. Possibly it is a toy.

Foreshafts for Arrows. Eleven complete, or nearly complete, wooden foreshafts for arrows were found. Not one of these foreshafts was notched to receive a flint arrowpoint. All the whole foreshafts are pointed at both ends (Fig. 31). In length they vary from 7 to 12½ inches. In diameter they are from ¼ to ⅜ of an inch. One, 10 inches long and ⅜ of an inch in diameter, has a sharp point at one end and is charred at the other. For a distance of 3 inches, just below the charred end, are tool marks in the form of shallow grooves and gashes extending slightly less than half way around. The shaft is made of hardwood and is well polished.

Another specimen, 9¾ inches long and ¼ of an inch in diameter, has one end sharpened for ½ an inch, while the other end tapers gradually from the center, indicating that only about five inches

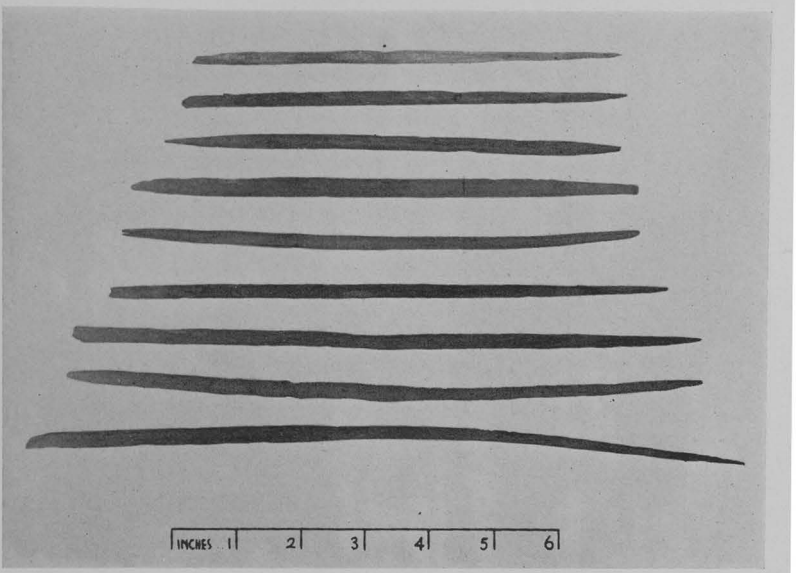

Figure 31. Probably wooden foreshafts with one end shaped for insertion in a reed mainshaft and the other sharpened for use without a flint projectile point.

of this foreshaft remained outside of the reed main-shaft. The "shooting-point," or distal end sharpenings, on these foreshafts range in length from ½ to ¾ of an inch.

The best made of the foreshafts and one of the smallest is 7⅛ inches long and ¼ of an inch in diameter. The sharpened "shooting-point" is ¾ of an inch long, and the tapered portion, for insertion in the reed, is 1¾ inches long. All of the foreshaft, except the portion tapered for insertion in the reed mainshaft, bears a dim coating of red paint. The foreshaft is straight and well polished.

Coffin reports a specimen of this type "inserted in and attached to a fragment of reed arrowshaft."[48]

Fragments of Bows (?). No whole bows, or fragments of bows that could definitely be identified as such, were found. There were, however, eleven fragments of flattened wood that may have been from the ends of bows or, possibly, from flattened rabbit sticks.

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[48]Coffin, *op. cit.*, p. 31.

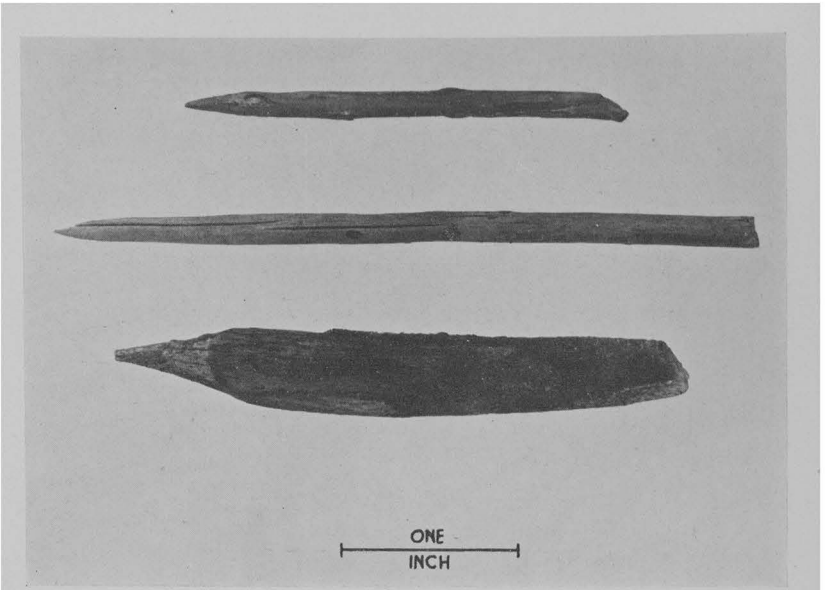

Figure 32. Wooden awl-like implements from upper level.

These fragments range in length from 1 to 3½ inches, in width from ¾ to 1¼ inches, and in thickness from ⅜ to ⅝ of an inch. All show considerable evidence of work done on them with a sharp tool, and four of them have one rounded and smoothed end. The other ends bear evidence of having been cut half way through, then broken off. Four of the pieces with rounded and smoothed ends have incised lines. Most of the lines merely run crosswise, but there is one fragment bearing an incised crosshatch design.

Another fragment, from a smaller stick, is flat on one side and convex on the other. It is 3¼ inches long, 1 inch wide at the end where cut off, ⅝ of an inch wide at the rounded end, and ¼ of an inch thick. It bears a crosshatch design in red paint. It is possible that this and all of these fragments were gaming devices or divining sticks.

Needles or Awls. In the debris of the upper level were found eighteen wooden needles and awls, ranging in lengths from 2½ to 11 inches (Fig. 32). Some are sharpened at both ends, others at one end only; some are well polished, others show little polish or use. The diameters of most of them are from ⅛ to 3/16 of an

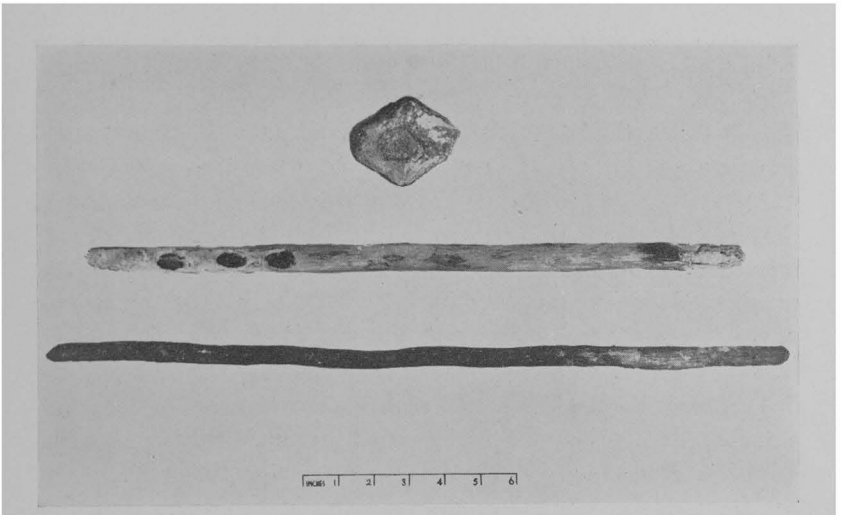

Figure 33. Fire-making implements: drill, hearth-stick, and possible drill cap.

inch; a few are larger. One specimen, 6½ inches long and ¼ of an inch in diameter, is sharp at one end and has a groove around it ⅜ of an inch below the blunt end. This may have been used as the "stringer" on a fish-string. Another specimen, 11 inches long, has the sharp end charred and a knob-like enlargement 2 inches long at the other end. There is also a slight evidence of fire at the large end. The diameter of this stick ranges from 3/16 to 5/16 of an inch. It is well polished. The other specimens of this type show no evidence of fire. The one that is charred appears to be a needle rather than a fire-drill or arrow foreshaft.

Fire-Making Implements. A number of specimens were found illustrating the method of fire-making (Fig. 33). They include eighteen hearth-sticks, six whole and twelve broken; four wooden fire-drills, one whole; and three possible stone fire-drill caps.

No bow, that could definitely be identified as such, was found. Two rough, unshaped but bent sticks, ⅛ to ¼ of an inch in diameter and 8 to 10 inches in length, may possibly have been used as bows in fire-making. The large end of one has about it several wraps of fiber-cord, while the other is wrapped with a split yucca leaf.

In discussing similar finds in Brewster County, Coffin says:

> Small bows, about a foot in length, made from a branch or twig, and bent with a string of fiber, were the only bows recovered. These

> were probably toys, for although they are strong enough to rotate a fire-drill, it is doubtful if they were used as such, for no parts of the fire-drills found show evidence of having been used in that manner.[49]

It is also doubtful as to whether the small pitted stones were used as drill caps; the pits are not sufficiently symmetrical and smooth.

All of the hearth-sticks are made of sotol flower stalks and, with only one exception, are split. A few of them show no signs of use; others have from one to four charred pits on the flat side. Lengths of the whole specimens range from 10 to 17 inches, with an average of 14 inches. The diameters of the pits range from 5/16 to ½ of an inch.

The perfect specimen of a fire-drill, of black or Mexican persimmon, 20¼ inches long and charred at both ends, has been discussed in connection with the data on excavation (page 30). There are fragments of one other hardwood and of two yucca stalk fire-drills.

Digging Sticks. Six digging sticks, one of which was broken, came from the debris of the upper level. One was pointed at both ends; five were pointed at one end and battered at the other. All are of hardwood. The lengths vary from 17 to 32 inches and the diameters from ½ to 1⅛ inches. Some of them were discussed in connection with the account of excavation.

Rhythm Stick (?). A fragment of a possible "rhythm stick" of soft wood came from a depth of 7 inches. It is 3½ inches in length and ½ of an inch in diameter. The notches, of which there are twelve, are about ¼ of an inch apart, ⅛ of an inch deep, and extend half way around the stick.

Reed Containers and Other Objects. Seven pieces of reed (*Arundo donax*) that came from the debris of the upper level may have been used as containers. Five of them have an opening at one end only, the septum at the bottom of the open joint not having been punctured. Two of the reeds are open at both ends; these two, and one of those having a closed end, have smoothly cut edges and show signs of use. The other four show little or no signs of use. In length they range from 2 to 6½ inches; in diameter, from ⅜ to ¾ of an inch.

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[49] *Ibid.*, p. 28.

Although two of them are charred at one end, they could not have been used as tubular pipes because, in both cases, one end of the reed is closed. One of the reeds that has a charred end was half full of what appeared to be powdered charcoal. When found, the open end contained no form of plug or stopper. This particular reed is 6½ inches long and 7/16 of an inch in diameter.

In addition to the reed nock ends, previously mentioned, there were two possible reed drills and what may have been a whistle. Fragments of reeds were found that may have been foundation bundles for basket-making.

Absence of European Contact

Nothing was found in the shelter to indicate that the Indians had ever come in contact with the white race.

Foods

Various articles indicative of foods were uncovered in the trenching throughout this shelter. Animal and bird bones were relatively scarce. Among the former were bones of deer, a few of buffalo, and several of the rabbit, small squirrel, and other animals. Bones of the following animals have been identified by Dr. Remington Kellogg, Assistant Curator of Mammals, Smithsonian Institution: raccoon, *Procyon lotor;* grayfox, *Urocyon cineroargenteus;* coyote, *Canis lestes;* cottontail, *Sylvilagus floridanus;* pocket mouse, *Perognathus merriami;* ground squirrel, *Ammospermophilus interpres.*[50] A few turkey and quail bones were present. Several fragments of the carapace of the land tortoise were discovered. A goodly number of fish bones, some of exceptionally large catfish, and one operculum of a sucker (*Catostomus*), were found.

Snails of a large species of *Bulimus* evidently formed an important item on the bill of fare. Literally thousands of snail shells are present at three distinct levels, in the top, in the middle, and near the bottom. The deposit near the bottom is just above the first fire pit, but few of the shells show signs of fire. The snail shells, intermixed with the burnt rocks, in the middle level are nearly all more

[50]U. S. National Museum, Report No. 123,340, to the Department of Anthropology of The University of Texas, June 15, 1933.

or less charred. The ones in the upper level, intermixed with fragments of sotol leaves, grass, cordage, fragments of basketry, and other midden material, are about half charred, while the others show no trace of fire. This would seem to indicate that many of the snails were consumed raw.

Nearly all the comparatively few fresh water mussel shells (*Unio* sp.) came from the middle level and were in association with animal bones.

Animal and fish bones are slightly more numerous in the midden deposit of the upper level. More bones of the deer and buffalo were found in the outer parts of the shelter, 60 to 98 feet from the wall, than in the portion nearer the wall. The bones of large animals were prevalent in the deep layers of burnt rocks and were accompanied by very few projectile points; whereas the deep ash deposit in the part of the trench adjoining the wall contained the bones of small animals and birds together with many projectile points.

The head of a "horned toad," a species of scaled lizard (*Phrynosoma cornutum*), was encountered, along with a few small bird bones, near the wall in an ash deposit at a depth of 18 inches, 150–3. Since the bones of the head were in perfect condition and still articulated, it seems that the head was severed from the body before the former was cast into the refuse heap. This suggests that the body may have been eaten.

The jaw of a garfish, along with the head of a large catfish, was found in the midden deposit.

The most numerous evidence of vegetal foods were of sotol crowns (*Dasylirion texanum* Scheele), mesquite beans (*Prosopis glandulosa*), and black persimmons (*Diospyrus texanum*). Tunas, or prickly pear (*Opuntia*) apples, seem to have held fourth place.

With regard to the Indians' fondness for the fruit of the prickly pear, we have a striking example in Cabeza de Vaca's account of the tribes of Southwest Texas making annual trips to a region where this food was plentiful.[51]

Seedpods of the various species of yucca were frequently encountered. Small wild onions and grass seeds were occasionally found. Some small acorns (*Quercus*) appeared in the upper level.

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[51]H. E. Bolton, *The Spanish Borderlands*, The Chronicles of America Series, v 23, p. 37.

A few of these were roasted, probably incident to being dropped in hot ashes. Hackberries were intermixed with the refuse, as were also so-called "stretch berries," the seeds of the common bramble.

The small western walnut (*Juglans rupestris*) was encountered from time to time. These walnuts were found at various depths. The finding of about one quart of crushed walnuts in a buried mortar hole has been recorded (page 42).

Many large beans of the juagilla (Wă-hē-ya) bush were found in the midden material. They resemble the mesquite bean, except that they are larger. A few beans of the catsclaw bush (*Acacia roemeriana* Schlecht) also came from the debris of the upper level. Tops of pepper-grass, tongue weed, or chick weed, as it is variously called, were present, but, of course, these may have served some other purpose than that of food.

Fragments of a few small gourds were found in the midden deposit in the upper level.

A few buckeye (*Aesculus pavia* L.) and numerous mountain laurel (*Sophora secundiflora*) seeds were present. Since the beans of both these plants are regarded by the present white population of Texas as not only inedible, but as poisonous, one wonders what can be the reason for their presence in these deposits. In one case a mountain laurel seed-pod contained three beans that rattled so loudly as to suggest its use as a rattler.

In Chabot's translation from the Spanish of Father Morfi's *Memorias* appears this statement regarding the Indians' use of the plant: "Laurel, which contains cianhidrico acid, as in bitter almonds, was burned in the home for good luck."[52] That might explain the presence of the charred mountain laurel seeds found in the midden material of this West Texas shelter. Local ranchmen say that, although the mountain laurel beans are supposed to be poisonous, stock eat them and show no ill effects.

A sharp lookout was kept for any evidence of corn, but not a trace in any form was found. It is possible, of course, that if the entire shelter were excavated some traces of corn might be found. But had it been as plentiful here as in Brewster and Culberson counties, where rock shelters and caves often contain many cobs, some

[52]Frederick C. Chabot, *Excerpts from the Memorias for the History of the Province of Texas, by Padre Fray Augustin de Morfi, 1673–1779*, p. 70.

signs of it would have been discovered in the course of our four weeks of intensive work in this shelter.

Nothing was found to indicate the presence of squash, pumpkin, or other domesticated plants.

Scores of lechuguilla fiber quids, some with teeth prints plainly visible, were found in the debris of the upper level; also many "toothbrush" quids of young lechuguilla flower stalks chewed at one end (Fig. 10). The handle to the so-called "brush" averages two inches long with the chewed end adding about one inch, making a total length of some three inches.

Intermixed with the midden material and debris was a noticeable amount of human and animal excrement.

Pockets of Debris

No slab-lined cists nor "house-sites" were found in the shelter. At several places, however, the deposit of debris dipped downward into a pocket-like depression in the ash and burnt rocks. These pockets were small, rarely more than two or three feet in diameter, and usually not over a foot deep. The material in the depressions differed in no way from that in the shallower deposits of debris adjoining.

Summary of Finds, Site No. 1, Seminole Canyon

A detailed discussion of each of the 3,130 pieces entered on the field catalogue as taken from the earth would involve much useless repetition. The general types and outstanding specimens in the various groups have been dealt with. To make the record more complete, a concise summary of finds is herewith added.

Class of Artifacts	Number Specimens		
	Whole	Broken or Fragmentary	Total
Flint projectile points	1384	1624	3008
Flint scrapers	252	61	313
Flint knives	130	39	169
Flint knives with corner tangs	----	2	2
Flint awl with corner tang	1	----	1
Flint awls or drills	16	5	21
Flint bone crushers	10	----	10
Flint war club spikes	13	----	13

Class of Artifacts	Number Specimens		
	Whole	Broken or Fragmentary	Total
Flint fist axes *(coups-de-poing)*	2	----	8
Flint ax	1	----	1
Flint spokeshave	1	----	1
Flint gouges	3	----	3
Flint hoe blade (?)	1	----	1
Metates	32	7	39
Metates bearing red paint stains	4	----	4
Mano stones	116	27	143
Manos bearing red paint stains	5	----	5
Rubbing stones, volcanic lava	7	----	7
Pitted stones	3	----	3
Fragment of pestle stone	----	1	1
Abrading or sharpening stone, large	1	----	1
Sandstone grinding rock	1	----	1
Carved stones	5	----	5
Painted pebbles	40	8	48
Painted stone, large	1	----	1
Scratched pebbles	8	2	10
Shaped pebbles (showing no paint)	51	5	56
Hammerstones	2	----	2
Stone ball	1	----	1
Drilled pebbles	1	1	2
Fossils (in graves)	2	----	2
Stone with asphalt coating	1	----	1
Yellow ocher (limonite), ground, molded, or shaped	----	2	2
Orange-colored ocher (not shaped)	1	----	1
Red ocher (hematite) paint stones	10	----	10
Paint-grinding pebble (mano)	1	----	1
Charcoal "pencil" (used)	1	----	1
Stone fire-drill caps (?)	3	----	3
Yucca fire-sticks (split) (hearth sticks)	6	12	18
Wooden fire-drills	1	3	4
Digging sticks	5	1	6
Sharpened awl-like sticks, small	3	----	3
Wooden needles and awls	16	2	18
Wooden foreshafts for arrows	11	----	11
Wooden needle (?), extra long	1	----	1
Wooden foreshaft for atlatl darts	1	1	2
"Fuzz" stick (problematical)	1	----	1
Wooden stakes (cut sticks)	6	----	6
Notched and grooved sticks	3	2	5
Painted sticks	1	1	2
Fragments of worked reeds	----	2	2
Fragments of unworked reeds	----	3	3

Class of Artifacts	Number Specimens		
	Whole	Broken or Fragmentary	Total
Bundles of tied sticks	5	----	5
Nock ends of arrowshafts	----	4	4
Wooden scoop or shovel	1	----	1
Sticks and reeds wrapped and tied with cords	9	----	9
Pebbles wrapped and tied with grass	3	----	3
Worked bone wrapped and tied with yucca leaf	1	----	1
Grass stem wrapped and tied with sinew	1	----	1
Animal bone wrapped and tied with grass	1	----	1
Fragments of rabbit sticks	----	2	2
Wooden rabbit stick, carved	1	----	1
Carved wood (ends of bows ?)	----	3	3
Fragment of used wood	----	1	1
Reed whistle or call	----	1	1
Bone whistle or call	1	1	2
Bone implements for net making (?)	2	----	2
Wooden flaking tool	1	----	1
Deer bone flaking tools	9	6	15
Deer antler flaking tools and gouges	7	4	11
Cut deer antler pestles	----	2	2
Bone awls	35	18	53
Bone needles	4	----	4
Bone gouge	1	----	1
Bone beads	22	3	25
Snail shell beads	41	5	46
Stone bead, crude	1	----	1
Engraved mussel shell	1	----	1
Mussel shell palettes	3	----	3
Mussel shell spoons or ladles	4	2	6
Conch shell gorget, drilled	1	----	1
Shell pendant	1	----	1
Mussel shell rattles, drilled, in pairs	4	----	4
Tortoise shell cup	1	----	1
Fragment of gourd	----	1	1
Fragments of skins	----	20	20
Skin pouch (fragmentary)	----	2	2
Grass mat	----	1	1
Fragments of matting	----	168	168
Headbands, burden bands, or belts	----	16	16
Fragment of waterproof basket	----	1	1
Fragments of baskets	----	62	62
Sandals of yucca	97	52	149
Fiber pads (for sandals ?)	20	----	20

Class of Artifacts	Number Specimens		
	Whole	Broken or Fragmentary	Total
Sandal frames of yucca	2	----	2
Fiber cords, various lengths	----	139	139
Grass cords, various lengths	----	9	9
Skin thong	----	1	1
Fiber cords wrapped with skin	----	10	10
Fiber quids (chewed into balls)	80	----	80
Stick quids (chewed at one end)	44	----	44
Apocynum fiber, for cord making	1	----	1
Grass bed	1	----	1
Square-weave object	1	----	1
Bundles of grass and yucca leaves	10	----	10
Bundle of herbs	1	----	1
Fiber-cord nets	8	3	11
Grass nets	3	----	3
Prickly pear leaves tied and sewed	8	----	8
Piece of made (cemented) floor	----	1	1
Totals	2609	2349	4958
Numbers on field catalogue:			
Whole specimens			2609
Broken specimens			521
			3130
Other fragmentary specimens not catalogued			1828
Grand Total			4958

Comparisons Between the Archaeology of Val Verde County, Texas, and the Archaeology of the Southwest

In comparing the culture of the Fate Bell shelter with that of the Southwestern Basket Makers, Thomas summarized similarities as follows:

> 1. The practice of painting pictographs is common. The figures, as a rule, differ from the Southwestern pictographs in many ways; but a careful study of them might reveal numerous examples of common elements. The hand imprint, deer horn head-dress and a few animal drawings are suggestive similarities or identical elements.
>
> 2. The practice of burials within the cave may also be found in Arizona and Utah, although the methods of interment are different. No evidence of cist-like bins for storage or burials was observed in Fate Bell shelter.

3. The skeletal material has not been thoroughly studied, but the skulls seem to be undeformed and dolichocephalic in both regions.

4. The wooden implements conform to those further West more completely than do the other artifacts. The grooved, curved rabbit-stick, charred scoop-like objects, and supposed atlatl foreshaft specimens show striking similarity to like objects found in Arizona and Utah.

5. Snail shell beads are comparable even in the crude manner of opening an aperture for the string insertion with like beads of the Basket Maker level of the Southwest.

6. The practice of grinding paint materials to powder, mixing with a binding substance, and molding into cakes has been noted in Utah. In the Fate Bell shelter the ground pigment was molded into triangular bars.

7. The bone awls of Fate Bell shelter vary but little from the types of those found in Arizona. Incidentally, a small bone, drilled as if for a whistle, was recovered in the Bell shelter.

8. Fiber cordage, square knots, fur-wrapped fiber cords, and skin fragments of similar types are found both in Seminole Canyon and in the Southwest.

9. The sandals of Fate Bell shelter are square toed in shape. The fish-tail variety found further west is wholly lacking.

10. Mat weaving is similar. The checker weave and twilled specimens offer striking examples of identity. The burden bands are comparable in shape and weave, but the end weaving varies.

11. The basketry of both regions is largely of the coiled type, though the foundation bundles are of different construction. The Fate Bell shelter returns have several basket specimens that have the split and non-interlocking stitches, although the interlocking stitch is predominant.

Setzler, in summarizing his work in Brewster County for 1932, makes the following comparison with the Basket Maker culture of the Southwest:

> Among the important artifacts found this year are grooved club fragments (rabbit sticks ?); atlatl foreshaft, a blunt point, and the proximal or hand end of an atlatl; two fragments of painted, twined woven bags, and a small sample of cloth woven with *apocynum* fiber, selvaged and complete. As similar specimens have been found with Basket Maker burials in the San Juan region, we have here, for the first time, evidence which may serve to indicate the relative age and development of our non-pottery culture in the Big Bend area. But it should be noted in this connection that associated with the specimens above mentioned we also found numerous arrow shafts and foreshafts which are not a characteristic of the classic era of the Basket Maker culture. They seem to suggest, rather, that the Texas cave dwellers lived during a transitional stage between the Basket Maker III and Pueblo I periods. Absence of pottery and house types in the Big Bend region still complicates this problem of possible relationship.

Continuation of our studies may clarify this phase of the pre-history of southern Texas.[53]

Since the grooved club and atlatl foreshaft have been found, and the absence of pottery noted, in Val Verde County, it would seem that the above comparison with the San Juan region applies in a measure to the Seminole Canyon region as well.

Comparisons Between the Archaeology of Brewster and of Val Verde Counties, Texas

Certain similarities and differences are noted between the published reports of explorers in Brewster County and our finds in Val Verde County.

Similarities. 1. Rock shelters in both Brewster and Val Verde counties contain pictographs, including hand imprints. But, so far as can be determined from the few published reports and the limited amount of reconnaissance work The University of Texas has done in Brewster and adjoining counties, it seems that the number and variety of pictographs in shelters within a radius of ten miles of the Fate Bell shelter exceeds that of any like area in Brewster County.

2. Painted pebbles and metates are found in both Brewster and Val Verde counties. Reported finds, however, seem to suggest that painted pebbles were more numerous in the latter region.

3. A number of similarities are noted in stonework. Notable among such are the manos worn to a sharp edge on one side. Pitted hammerstones appear to be abundant in Brewster but are relatively scarce in Val Verde county. On the other hand, metates do not seem to be as plentiful in Brewster as in Val Verde county. Abraded boulders are found in and adjacent to shelters in both regions. Each region has yielded a number of unworked stones wrapped and tied with grass.

4. Various wooden artifacts from the two regions are comparable. Among these may be mentioned grooved rabbit sticks, notched foreshafts for projectiles used with throwing sticks, arrow foreshafts, pointed digging sticks, fire drills, yucca fire hearth sticks, scoop-like objects, gaming sticks, rhythm sticks, and small sticks with tenon-like ends. All these were represented in the Fate Bell shelter. No bows, identifiable as such, were found in the shelter.

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[53]Setzler, *op. cit.*, p. 56.

5. Nock ends of reed arrowshafts have come from both regions. What appear to be reed containers, without stoppers, have been found in Val Verde County and seem to be almost identical with those reported from Brewster County.

6. Antler implements from the two regions are comparable.

7. Bone awls and flaking implements are comparable. But no bone artifacts bearing painted or carved decoration were found in the Fate Bell shelter.

8. Quids in considerable numbers have been found in the debris of shelters in both regions.

9. Although a number of gourd fragments are reported from shelters in Brewster County, a very few of such fragments came to light in the Fate Bell shelter.

10. Nets made of fiber cords are common to both regions. Two types, the slip-knot and open-coil without foundation, are found in both sections.

11. String fragments of the two- and four-strand types, knots in the cordage remnants and fur wrapped fiber twines were found in both areas. The square or reef knot prevailed in both places.

12. Shell work common to both areas includes pendants and beads of snail shells and fresh water mussel shell pendants.

13. From shelters in both counties have come fragments of leather or dressed hide, with the holes made in stretching still to be seen at the edges.

14. Fragments of matting illustrating the checker weave and twilled types are common to both regions. Unusual grass mats, with fiber cords piercing the grass blades, are reported from both Brewster and Val Verde counties.

15. The basketry of the two regions is also very similar. The foundations of splint and yucca leaf types with interlocking, non-interlocking, and split stitches have been reported from both areas.

16. Raw materials, in the form of bundles of sotol leaves, grass, etc., have been found in the shelters in both counties.

17. With regard to sandal technique, the reënforcing method of vertical cross braiding seems to be identical in the two areas, as does also the opposed element warp frame. The tie-strings have a few similar characteristics, in that the twist method of side attachment and the square knot heel straps are found in sandal types of both regions. But for these few similarities, there now seems to be

a decided difference in the sandal types and tie-strings of Brewster and Val Verde counties. Further exploration may tend to harmonize these apparent differences.

18. In the Fate Bell shelter in Val Verde County no pottery was found; there was no evidence of European contact; and real stratification was lacking. This is in exact accord with Setzler's finds in five caves explored in Brewster County in 1932. He says: "No vestige of pottery, European artifacts, or stratification appeared in any site examined."[54]

19. Cooking pits have been found in shelters in both areas. Cooking and roasting in large pits would seem to suggest identical modes of living in the two regions. Reports indicate that the camp refuse from both sections contained comparatively few animal and bird bones. Foods common to both regions include prickly pear seeds, mesquite beans, acorns, Mexican walnuts, seeds and pods of yucca, cacti, and fragments of sotol crowns.

Differences. There are also certain striking differences between the two regions. Outstanding among them are the following:

1. No remains of rock enclosures or "house-sites," such as reported from certain shelters in Brewster County, were found in the Fate Bell shelter.

2. Neither were there present in the Val Verde County site numerous thin layers of grass separating the midden deposits, like those reported by Coffin in Bee Cave Canyon, Brewster County, Texas. This would seem to indicate that while the latter shelter may have been "occupied as summer camp" the Fate Bell shelter was an all-year habitation.

3. No unbaked pottery figurines or potsherds, like those reported from certain sites in Brewster County, were found in Val Verde County. Neither were there any tubular or other kind of pipes found in the Fate Bell shelter in Val Verde County.

4. Fragments of atlatls, or throwing sticks, have been reported from Brewster County, but none was found in the Fate Bell shelter. Neither were any foreshafts with arrowpoints in place found in Val Verde County. No hammock or cradle-like objects in definite form were found in Val Verde County.

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[54] *Ibid.*, p. 56.

5. Corn cobs are fairly plentiful in Brewster County, but no evidence of corn was found in this Val Verde County shelter. No squash, pumpkin, or piñon seeds were found in Fate Bell shelter.

Comparison Between the Archaeology of Val Verde County and That of Central Texas

In comparing the Fate Bell shelter artifacts with those from the burnt rock mounds in Central Texas, Thomas has the following to say:

> Although Central Texas has been well studied by Professor J. E. Pearce, very few types of artifacts, aside from the abundance of bone, shell, and flint implements, have been found. The open and exposed condition of the mounds and the heavier rainfall of Central Texas render the preservation of perishable objects, such as matting, basketry, sandals, skins, and wood practically impossible in this region.
>
> 1. A few amateur collectors report the finding of fragments of matting, animal skin and cordage in the Central Texas area. But, so far, only a small fragment of such material, a piece of two-strand cordage twined from fibers of *Agave lechuguilla*, from a rock shelter in Coryell County, Texas, has reached The University of Texas Museum.
>
> 2. The bone work of Central Texas consists of awls and flakers. The awls are, as a rule, smaller, much more pointed and more damaged by water seepage than the bone implements of the trans-Pecos region.
>
> 3. Shell work in Central Texas is rarely found, and when found is usually not decorated.
>
> 4. The Central Texas Indians were skilled in the working of flint artifacts, and there is usually a large return of such objects from the excavation of every burnt rock mound. The limits of the use of the corner-tang awls and knives have been fairly well established in the Central Texas region; and it was a surprise to find four such specimens in the deposit of Fate Bell shelter, over two hundred miles to the west of the region of their greatest prevalence. The corner-tang awls of both regions clearly show reworking from flint knife blades having a corner-tang. The abundance and fine work of the flint artifacts at Fate Bell shelter parallel the corresponding finds of Central Texas. A majority of the types at this shelter are similar to what is found in the Central Texas area, but there is not as much identity as we had expected.
>
> 5. Projectile points similar to types Nos. 7 and 8 in Plate XII a are found in the bottom levels; points like type 6 in the middle levels; and other points similar to types 2 and 5 in the top levels of the burnt rock mounds of Central Texas.
>
> 6. The typical fine arrowpoints of Central Texas were not found in Fate Bell shelter, but are found in limited numbers on the surface in that region; and, also, in the Big Bend area generally. The small arrowpoints found in Fate Bell shelter were reworked from larger projectile points and are not typical microliths.

7. Fist axes of both regions are very much alike but show finer workmanship in Central Texas.

8. The burnt rock debris found in the shelter of Seminole Canyon is largely identical with the materials of hundreds of burnt rock mounds found in the central portion of the State. Although the inhabitants of Fate Bell shelter may not have been closely related culturally to the early Indians of Central Texas, there is considerable evidence of culture contact.

Conclusions

The work done by The University of Texas at Site No. 1, Seminole Canyon, represents the first extensive excavation in that hitherto little-known archaeological region in Val Verde County, Texas. While the large shelter was not completely excavated, it seems reasonably certain that the returns therefrom afford an accurate cross section not only of that site, but of the region as well.

As a result of this work, three unusual types of artifacts are recorded: first, a distinctive type of flint projectile point; second, two unique sandal types with peculiar tie-string attachments; third, a type of basketry that seems to be peculiar to this culture area.

In addition, this work has brought to light evidence tending to show relationships as follows:

1. Certain artifacts from this region are very similar to cognate forms from the Basket Maker culture of the Southwest. But there are, it must be said, decided differences.

2. As would be expected, the Val Verde County material bears a closer relation to that from Brewster County in the Big Bend region of Texas than to that of the farther Southwest. There are, none-theless, some remarkable differences.

3. Of particular interest is an unmistakable resemblance of certain culture traits of Val Verde County with traits in the burnt rock mound region of Central Texas.

Much additional work must be done in Val Verde County, and in the adjacent regions to the east and the west, before all problems of relationship can be solved. Present indications, however, seem to be that Seminole Canyon was in an overlapping marginal area for several cultures. This is to be expected from the locations of the river systems and the overlapping of climatic and other geographical features.

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